MARKETING OF ALFALFA SEED IN KANSAS

by

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B. S., Kansas State College
of Agriculture and Applied Science, 1952

A THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE COLLEGE
OF AGRICULTURE AND APPLIED SCIENCE

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INTRODUCTION

A Marketing Problem

Alfalfa seed has become in recent years a rather important crop in Kansas, especially in certain production areas. However, there has been very little information on either the services and functions of the seed industry which handled the seed or on the methods of pricing and the factors which underlie the determination of alfalfa seed prices which Kansas farmers and dealers receive.

As an indication that a problem existed in this area, there was a request made for information on the advisability of adding seed processing services to the enterprises of a firm in southwest Kansas, an important alfalfa seed producing area. With the increased demands which growers are making for high quality seed, the general assumption is that increased services in performing the functions of handling and processing seed between the producer and utilizer are desirable to increase the quality of Kansas seed in order to compete with seed from other surplus production areas.

In order to evaluate this general proposition it is necessary to gain an understanding of the nature of the production of alfalfa seed, of the functions and services which the seed business performs and of the part which pricing and price movements play in the alfalfa seed industry. This work, therefore, was based on the idea that a study of a production area and of a group of processors within this area would provide a

basis for a better understanding of these factors involved in alfalfa seed marketing.

In developing this study other related questions which came up were:

1. What is the nature of the firms in the seed marketing channel?
2. What methods of pricing are used?
3. What factors influence the price of alfalfa seed?
4. How does uncertainty of price affect the market?
5. When should producers and dealers market alfalfa seed?

It is the purpose of this study to investigate some of the institutional and functional aspects of the alfalfa seed industry in Kansas and to analyze some of the factors influencing price in order to gain a better understanding of these problems in marketing alfalfa seed.

Procedure

Alfalfa seed has been considered to be a highly variable and unstable crop as a farm enterprise. This proposition was tested. Since production is highly variable, the seed industry in Kansas, which is largely dependent upon alfalfa seed, was expected to have characteristics differing from the grain industry handling the other important crops of Kansas. Some of these characteristics were examined.

As a corollary of the hypothesis on the nature of production and the characteristics of the seed industry, price movements would be expected to differ markedly from price movements of

crops which have more stable production and a more highly organized marketing system. A study of the seasonal price movement and the relationship of alfalfa seed prices to other prices was made in order to determine how these prices behaved.

In order to get a better understanding of the various aspects of alfalfa seed marketing, this study has been divided into three sections. The first section is a study of factors related to the importance, variability and location of alfalfa seed production. The second section describes a group of alfalfa seed processors and the marketing functions which are performed by these firms. These firms were located in the Arkansas River Valley area, an important seed production area in Kansas. The third section is a study of the seasonal movement of alfalfa seed prices and a partial analysis of factors which influence annual prices of Kansas alfalfa seed.

IMPORTANCE OF ALFALFA SEED

In order to estimate the magnitude of the alfalfa seed marketing problem, the question of the relative importance of alfalfa seed to the agricultural economy in general and in the specific areas studied must be considered.

Unlike the familiar grain and oilseed crops produced in Kansas which have many feed and by-product uses, alfalfa seed has but one major use which is the production of forage and dehydrated alfalfa meal for livestock feeding. Alfalfa also has been used in the production of some clorophyll, carotene

and other commercial products. At present the amount of alfalfa used in this manner is quite limited.

Graumann and Hanson of the United States Department of Agriculture in "Growing Alfalfa" have this to say about uses and values of alfalfa.

> Alfalfa is one of the most palatable and nutritious crops grown for forage in the United States. The hay is rich in proteins, minerals and vitamins besides being low in fiber. These excellent feeding qualities together with high yielding ability make alfalfa one of the most valuable forage crops for hay and dehydration. Alfalfa also is used for pasture and is a highly effective cover crop for preventing soil erosion.[1]

Morrison indicated that the reason for the popularity of alfalfa hay in relation to other forages is the high yield per acre of nutrients and the high protein value of the forage. The following table computes from averages of the whole country shows the relative value of alfalfa hay in relation to clover and timothy hay and corn silage.[2]

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[1]H. O. Graumann and C. H. Hanson, "Growing Alfalfa", U. S. Department of Agriculture, Farmers Bulletin No. 1722, Revised 1954, p. 1.

[2]Frank B. Morrison, Feeds and Feeding, 21st Edition, p. 340.

Table 1. Average yields of nutrients from alfalfa hay and other crops.*

	Yield per acre	Dry matter	Digestable protein	Total digestable nutrients
	tons	lbs.	lbs.	lbs.
Alfalfa hay	2.33	4,036	468	2,243
Clover and timothy hay	1.42	2,502	136	1,454
Corn for silage	8.00	4,384	192	2,896

*Source: Frank B. Morrison, Feeds and Feeding, 21st Edition.

In 1954 only three crops were grown on more acres in Kansas than was alfalfa. These crops were, in order of their importance: wheat, grain sorghums, and corn. Figures for the 1954 harvested acres were: wheat, 10,069,000 acres; grain sorghums, 3,217,000 acres[1]; corn, for all purposes, 2,082,000 acres; and alfalfa hay, 1,381,000 acres.[2]

Alfalfa also ranked fourth in number of acres harvested in the United States in 1954. The crops using more land were, in order of their importance: corn, with 79,875,000 acres; wheat, with 53,712,000 acres; and oats, with 42,151,000 acres as compared to alfalfa with 22,996,000 harvested acres.[3]

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[1]Kansas State Board of Agriculture, "Kansas 1954 Sorghum Grain Production by Counties", mimeo release, March 1955.

[2]U. S. Department of Agriculture, Crop Production, July 1955.

[3]Ibid.

To more firmly indicate the position of alfalfa in the country's agricultural economy, its position in relation to other hay crops may be examined. In relation to tonnage produced, it has led in U. S. production as indicated by the 1944-53 average production of 36,890,000 tons compared to a clover and timothy hay production average of 31,115,000 tons for the same period.

Trends in Alfalfa Hay and Seed Acres in United States and Kansas

Alfalfa was first planted in Kansas shortly after the Civil War. Acreage increased rather slowly in the early days and by the year 1900 there were less than 300,000 acres of alfalfa in the entire state of Kansas. But alfalfa acreage expanded rapidly after the turn of the century and by 1916 there were approximately 1,400,000 acres in the state planted to alfalfa.[1]

From 1916 to 1938 the trend was downward, although wide fluctuations have taken place along the trend line. Since the extreme low of 394,000 acres in 1938 the trend has been generally upward, again with considerable fluctuations and in 1954 reached an estimated 1,381,000 acres, just short of the 1916 peak acreage.[2]

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[1]Robert E. Marx, unpublished Masters Thesis, "Economics of Alfalfa Seed Production in Kansas", Kansas State College, Manhattan, Kansas, p. 5.

[2]See Figure 1 for charted acreage 1925-1954.

In contrast to the decreasing and then increasing trend in alfalfa hay acreage, the acreage harvested for seed has tended to increase from 1919 to 1954 although there have been wide and sometimes rather violent fluctuations from this upward trend. This trend is probably due largely to an increasing demand for Kansas grown alfalfa seed in Eastern markets. The all-time high was set in 1952 when 250,000 acres were harvested for seed. Figure 1 shows graphically the trend in hay and seed acres harvested in the years from 1925 through 1954.

In the United States the trend in alfalfa hay acreage since 1919 has been steadily upward. The trend in seed acreage harvested has also been upward but with much more violent fluctuations.[1]

Trends in Yield of Alfalfa Seed

The yield of Kansas alfalfa seed since the peak yield of 3 1/3 bushels per acre in 1930 has been generally downward (1 bushel equals 60 pounds). Figure 1 shows a marked shift downward from 2½ bushels in 1935 to 1.4 bushels average in 1936. It has been theorized that the advent of the combine and delayed harvesting has contributed to the low level of yields in recent years. The record low yield of one bushel was

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[1] A useful historical analysis of United States alfalfa hay and seed acreage trends, 1919-1950, has been published in William Herr and G. L. Jordan, "The Pricing and Utilization of Legume and Grass Seeds", University of Illinois, Ag. Exp. Sta. Bul. 582, December 1954.

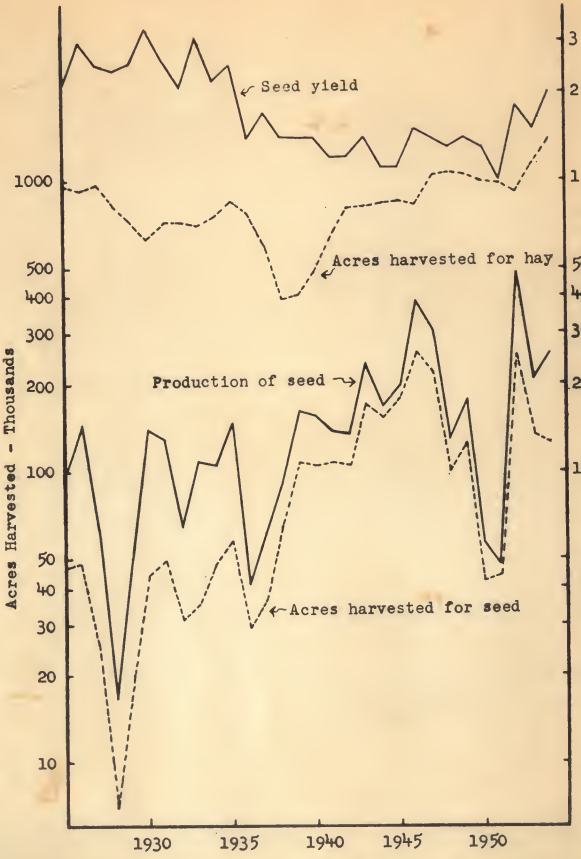

Fig. 1. Kansas trends in hay acreage, seed acreage, seed production and seed yield of alfalfa 1925-54.

reached in 1951, an extremely wet year in Kansas and unfavorable to seed setting. Since then yields have climbed back to above the 1½ bushel level.

Since the low in 1944, U. S. yields have increased noticeably. The decline throughout the 30's and early 40's has been attributed to the bringing into use land which was not very productive for seed.[1] Since 1950 there has been a noticeable shift in seed production in the United States to areas which are more favorable to high yields of alfalfa seed.[2]

Variability of Production, Yield and Acreage

In Kansas the trend in seed production has followed rather closely the upward trend in acreage harvested for seed. In general the variations in production has also followed the variation in acres harvested.

Waite and Trelogan indicate that for field crops such as grains, most of the variability of production is due to yield variations from year to year. They indicate that yield is responsible for a greater portion of the variation than acreage changes.[3]

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[1]William Herr and G. L. Jordan, "The Pricing and Utilization of Legume and Grass Seeds", Illinois Agricultural Experiment Bulletin 582, December 1954, p. 15.

[2]See Figure 7 which shows the 1950-54 major areas of production.

[3]Warren C. Waite and Harry C. Trelogan, Agricultural Market Prices, p. 65.

Table 2 indicates that for Kansas alfalfa seed, fluctuations in acreage have been more important than yield in causing production variations. There were on an average 82 percent difference in alfalfa seed production in successive years, arising from a 17 percent change in average yield and about a

Table 2. Percentage changes from preceding year in production, acres harvested and yield of alfalfa seed, Kansas, 1935-54.

Year	Percent change in acres	Percent change in yield	Percent change in production
1935	+ 19.93	+ 13.64	+ 34.70
1936	- 49.65	- 44.00	- 71.80
1937	+ 24.14	+ 21.43	+ 50.25
1938	+ 80.56	- 17.65	+ 49.18
1939	+ 76.92	+ 0.0	+ 76.92
1940	- 04.35	+ 0.0	- 04.35
1941	+ 04.54	- 14.28	- 10.39
1942	- 02.61	+ 0.0	- 02.90
1943	+ 51.78	+ 16.67	+ 77.61
1944	- 10.00	- 21.43	- 29.41
1945	+ 16.34	+ 0.0	+ 16.34
1946	+ 44.94	+ 36.36	+ 97.45
1947	- 15.50	- 06.67	- 21.19
1948	- 54.13	- 07.14	- 57.38
1949	+ 26.00	+ 07.69	+ 35.38
1950	- 65.08	- 06.67	- 67.61
1951	+ 09.09	- 23.08	- 15.79
1952	+420.83	+ 80.00	+854.17
1953	- 46.00	- 16.67	- 54.80
1954*	+ 05.18	+ 13.33	+ 14.49
Average change	51.38	17.34	82.12

*Based on preliminary estimate.

51 percent difference in acreage in successive years. Thus, acreage appeared to be roughly about three times as important as yield changes in producing year to year variations in the alfalfa seed crop.

Herr and Jordan found that for the period 1931-50 the average change in United States production of alfalfa seed was 21.77 percent which was due to a 12.46 percent change in yield and a 22.25 percent change in acreage.[1]

Although the above indications point to acreage as the most important factor in both Kansas and U. S. production, yield is probably more important than is indicated by these figures since fluctuations in seed acreage harvested tends to be caused partly by farmers' expectations of high or low seed yields. When he expects yields to be low, the seed acreage harvested will be decreased because these fields will tend to be harvested as hay rather than seed. But if the seed yield tends to be high, again assuming a given ratio of value of hay to the value of seed, more acreage is likely to be harvested for seed. It is therefore difficult to determine the total effect of changes in yield on total production.

The above condition is also reinforced by the general tendency that when the crop, i.e. cutting, in question looks favorable for a large yield of hay, the expectation of a good seed yield is often rather low and on the other hand when there is a poor vegetative growth it is usually due to weather conditions which if they continue will be favorable to seed setting and anticipations of a good yield of seed.

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[1]Herr and Jordan, op. cit., p. 17.

Due to this situation of production, the price ratio of alfalfa hay price to alfalfa seed price may be less influential to the individual producer than might otherwise be expected since usually a normal crop of one is not given up to obtain a normal crop of the other but instead an anticipated poor crop of seed is given up to obtain an estimated good crop of hay or the estimated poor hay crop is given up in anticipation of a more favorable seed crop. Thus the producer is in a decision-making situation where he may tend to take a good yield expectation and hope that an uncertain price ratio will also be in his favor, although since alfalfa is primarily grown for hay, a grower's feed needs may at times outweigh consideration of seed prospects. Price ratio also may become an important factor in years when the expectation of one price is exceptionally out of line with the other.

Comparisons of Production Variability Between Areas

In considering differences in variability of seed production between the area selected for study (the 16 counties adjacent to the Arkansas River) and the state total production, it was noted that in the period 1944-53 (see Fig. 2) the production of alfalfa seed in this area has varied from 9.8 percent in 1948 to 42.9 percent of the state's total production in 1951 with no apparent trend. The 10-year average percentage was 30.8 percent of the Kansas production.

In order to determine the relative variation in production in this area compared to that of the remainder of the state,

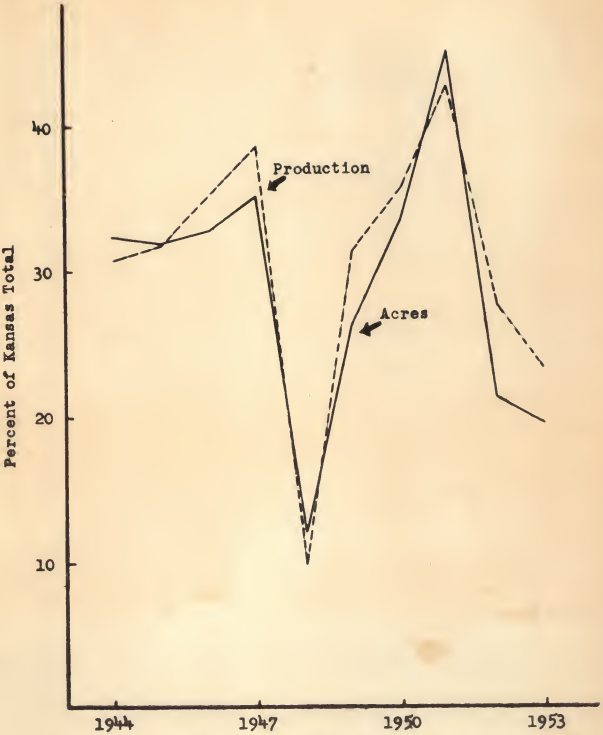

Fig. 2. Trend in production and acres of alfalfa seed in the Arkansas Valley area (16 counties adjacent to the Arkansas River) as a percentage of Kansas total production and acres, 1944-53.

two methods of measurement of variation were used. The first approximation was the link relative form as used in the yield, acreage and production variability comparisons.[1]

Since the year to year variability is the factor of variability which is probably most noticeable to both producers (example--effect on farm income from one year to the next) and processors (income, plant capacity problems, outlet and sales problems, etc.) in that they have to adjust their operations to fit sudden changes which appear typical of alfalfa seed production. Hence for summarizing the variability of production this method seems to offer a measure which seems to be valuable although not as sophisticated or statistically rigorous as other methods. Another advantage for this type of index is that since each previous year is used as a base, trend is accounted for as the index progresses.

The coefficient of variability of production computed in this manner for the period 1944-53 for the Arkansas Valley area was 125.03 percent compared to an index of 149.28 percent for the remainder of the state during the same period. Both of these coefficients are very high indicating a high year to year variation in production of this crop in the Arkansas River Valley area as well as in the remainder of the state.

The second measure of relative variation of state production compared to the Arkansas Valley production was by means

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[1]See Waite and Trelogan, op. cit., p. 65 for an explanation of this method.

of the coefficient of variation. This term expresses the standard deviation of the annual series as a percentage of the arithmetic mean of the series and provides an index that may be used to compare the relative production variability of areas with different production averages. It also provides an indication of the relative scatter of the yearly items about their mean.[1]

The coefficient of variation in the production of alfalfa seed for the period 1935 to 1953 was computed for both the Arkansas Valley area and remainder of the state. The Arkansas Valley coefficient of variation was 62.13 percent as compared to 68.0 percent for the remainder of Kansas. The size of these coefficients indicate a wide scatter of yearly production about the series average. The Arkansas Valley area's 1935-53 average production was 58,294 bushels. The 1935-54 state average production was 177,230 bushels. Figure 3 shows the trend in alfalfa seed production in the Arkansas Valley area from 1935 to 1953.

PRODUCTION AREAS

It is a rather unique situation that the geographical areas having the largest acreage of alfalfa are not the areas which produce the most seed. Alfalfa produces seed in paying quantities only where the summer rainfall is comparatively

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[1]See Snedecor, George W., Statistical Methods, p. 40 for explanation of this technique.

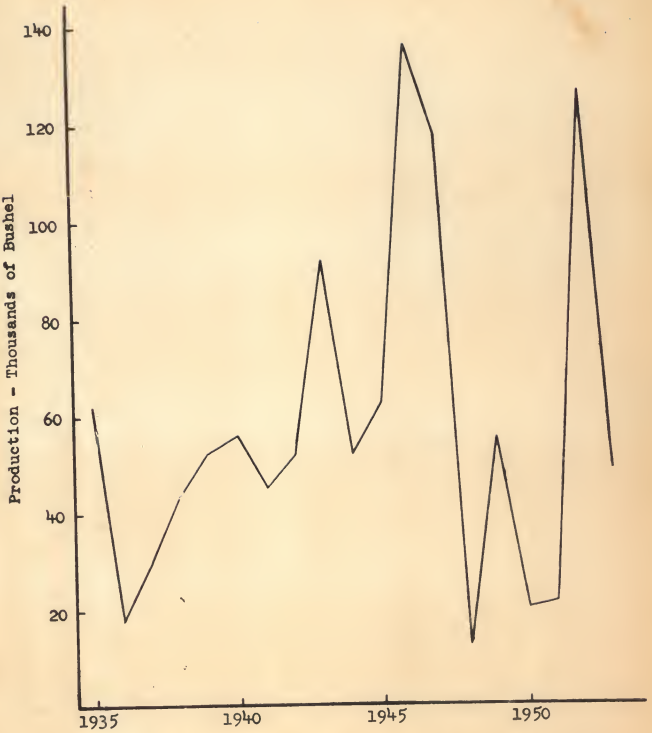

Fig. 3. Alfalfa Seed production in the Arkansas Valley area (16 counties adjacent to the Arkansas River), 1935-53.

light. For this reason the western part of the United States has become the chief seed producing region. But even in Kansas, Nebraska and other Western alfalfa seed producing states the seed crop fails if the season happens to be wet. In abnormally dry seasons considerable seed has been produced in the Eastern part but ordinarily it's more profitable in the Eastern states to purchase seed that is produced in the West than for a farmer to attempt to grow it himself.[1]

Figure 4 shows that the 1954 alfalfa hay areas of concentration are in the Central and Great Lakes region. Figure 5 shows that the seed production area of the United States are concentrated largely in the Great Plains and irrigated areas of the West with very little seed production in other states. Table 3 indicates that California has been the leading seed producing state in the past five years. In the previous decade (1940-49) Kansas led in average annual production.[2] Since 1950 the state of Washington has become an important seed producer with an average production somewhat higher than the Kansas five year average of slightly over 12,000,000 pounds. The Kansas five year average does not show much change from the 1940-49 period when Kansas produced an average of 12,420,000

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[1]H. L. Westover, "Growing Alfalfa", U. S. Department of Agriculture, Bulletin 1722, 1954.

[2]C. O. Grandfield, "Alfalfa in Kansas", Kansas Agricultural Experiment Station Bulletin 346, January 1951, p. 41.

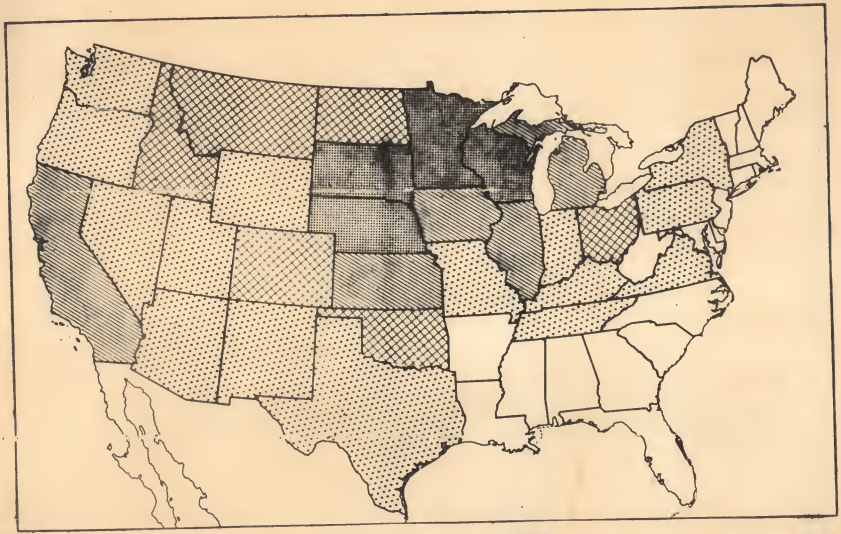

Fig. 4. Alfalfa Hay: Acreage harvested by states, 1954.

Fig. 5. **Average annual alfalfa seed production in the United States, 1950-54. Each dot represents 500,000 pounds.**

Table 3. Pounds of alfalfa seed produced in the 10 leading states, 1950-54.

State	1950	1951	1952	1953	1954[a]	5-year average
			Thousands			
California	31,000	25,000	39,900	45,045	59,040	39,997
Washington	7,000	15,100	18,810	14,875	12,375	13,632
KANSAS	2,300	2,900	27,500	12,350	15,065	12,021
Utah	8,900	11,500	10,600	10,350	10,000	10,270
Nebraska	11,100	9,700	6,800	5,400	6,080	7,816
Arizona	4,200	2,200	15,800	11,070	7,820	8,218
Oklahoma	8,100	6,700	11,300	3,864	750	7,743
South Dakota	6,300	5,900	7,800	5,772	7,700	6,694
Montana	3,100	2,900	12,960	6,300	9,100	6,872
Idaho	5,400	6,400	6,400	4,995	4,760	5,591
Ten states						
United States	104,950	104,620	180,340	137,845	156,738	136,899

[a]Preliminary.

Source of Data: U. S. Department of Agriculture, Agricultural Statistics, 1952-1953.

U. S. Department of Agriculture, Crop Reporting Board, Field and Seed Crops, May 1955, p. 28.

pounds of alfalfa seed.[1] The major seed production areas in Kansas are the Arkansas Valley, the Northern border counties between the 96th and 100th meridian, and the Flint Hills and the area that borders them on the West. The dot chart, Figure 6, shows which counties have been important producers in recent years. Reno County has been the largest producer with a five year average of 514,680 pounds which was more than 66,000 pounds greater than the next ranking seed producer, Republic County. The other counties in the 1949-53 top ten were, in order: Washington, Jewell, Finney, Sedgwick, Stafford, Saline, Dickinson and Meade.

When the counties adjacent to the Arkansas River are combined into one area, this area accounted for approximately 32.3 percent to the 1949-53 state average production. This area had four of the top ten counties which helped to account for its importance. These counties were Reno, Finney, Sedgwick and Stafford.

Areas of Adaptation

There are three rather definite areas of adaptation to the production of alfalfa seed. These areas depend upon the hardiness of the varieties or adaptability to termperature conditions. The hardy types are essential to the colder Northern states, while medium hardy varieties are grown in the Central region and the non-hardy group are grown on the far Southern

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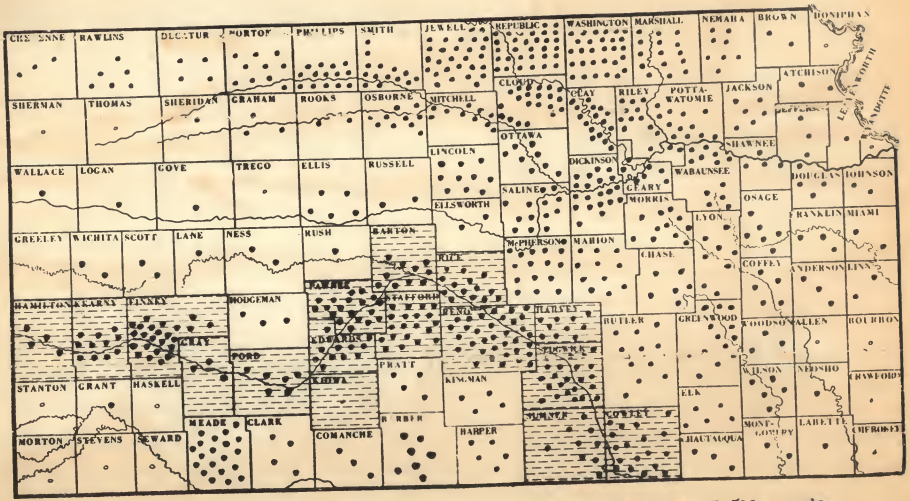
[1] Ibid, p. 40.



Each • = 15,000 pounds

Each · = less than 7,500 pounds

Fig. 6. Average annual alfalfa seed production in Kansas, 1949-53.

border. Figure 7 shows the approximate boundaries between these regions. Seeds for hay and pasture cannot readily be changed from a Southern area to an area to the North since the less hardy variety will tend to winterkill.

Kansas common alfalfa is a medium hardy variety adapted to the Central region. Buffalo alfalfa, a selection from Kansas common, is also considered a medium hardy variety although it may be slightly more winter hardy than Kansas common and therefore adapted to regions somewhat farther North. Figure 8 indicates the regions of adaptation of buffalo alfalfa.

Production and Sale of Certified Seed in Non-hardy Areas

With respect to winter hardiness, it has been found that alfalfa can be grown outside its area of adaptation for one generation without altering its cold resistance quality. In some of the irrigated Southern areas of the United States, seed production has become a specialized industry and the most successful growers are those who regard seed production as the main objective of their operation rather than incidental to the production of hay. For example, because non-hardy varieties produce more hay in California, that state does not recommend the hardy varieties (Ranger, Buffalo, Atlantic, Narragansett and Vernal) for hay production, although all five are grown for out-of-state seed markets.[1]

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[1] E. H. Stanford and others, Alfalfa Production in California, Calif. Agric. Expt. Sta., Circular 442, November 1954, p. 17.

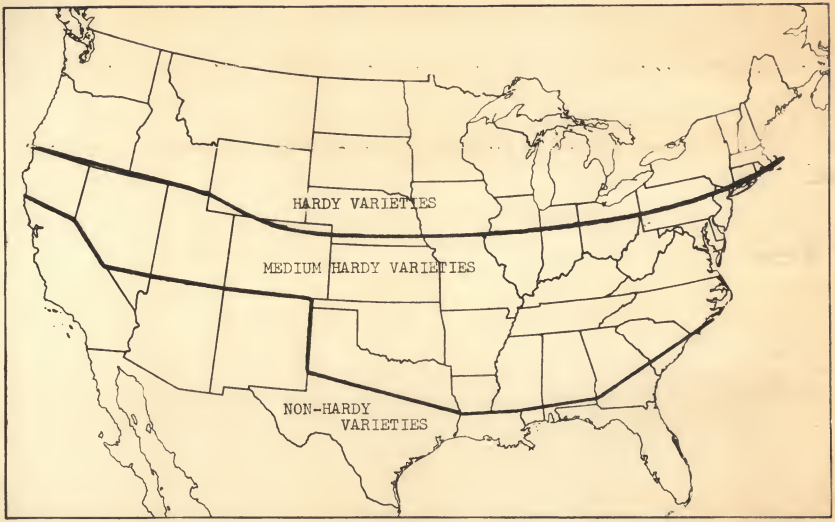

Fig. 7. Areas of adaptation of alfalfa seed varieties. Source: Illinois Agricultural Experiment Station Bulletin 582, 1954.

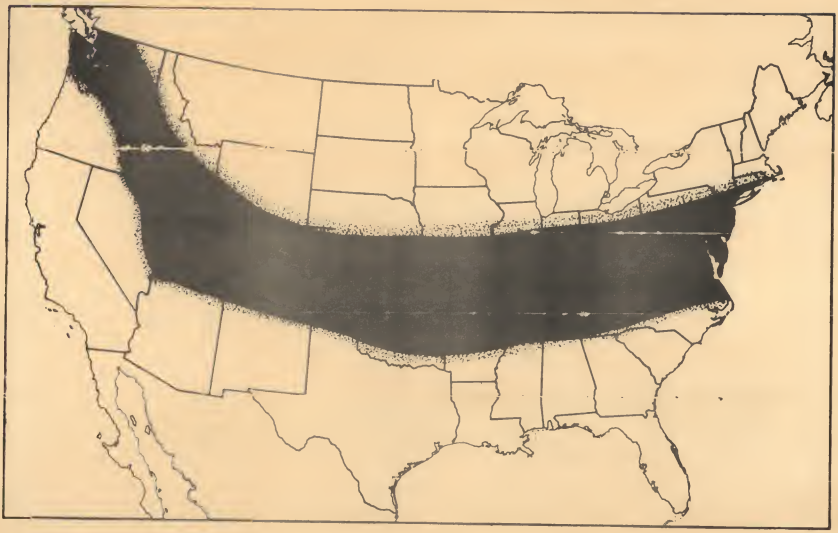

Fig. 8. Regions of adaptation of Buffalo alfalfa. Source: United States Department of Agriculture Farmers Bulletin 1722, Revised, 1954.

REVIEW OF LITERATURE

A review of literature is usually undertaken in preparing a thesis in order to learn what previous work has been done which relates to the problem set forth. It has also, in the case of this study, been helpful in pointing out some of the problems in the organization of marketing and especially in the study of alfalfa seed prices.

The chief sources of alfalfa seed marketing information which have been most valuable were three studies which were largely price studies of the field seed industry in general, including alfalfa seed. Apparently no separate study of alfalfa seed marketing has been published.

History of Alfalfa Seed

Alfalfa is one of the oldest forage crops in the world. It is generally believed that alfalfa originated in southwestern Asia. Although forms from which it might have developed have been found in China and Siberia, the Persians are believed to have been the first to grow the plant.[1] About 44 B.C. it was introduced into Greece, then into Italy and Spain and the rest of Europe. It was introduced in the American colonies under the French name Lucerne. The word alfalfa is said to be of Arabic origin meaning "best fodder."[2]

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[1]Westover, H. L., op. cit.

[2]H. M. Tysdall and H. L. Westover, "Alfalfa Improvement", U. S. D. A. Yearbook, 1937.

The first recorded attempt to grow alfalfa in the American colonies was in 1736 where it was reported grown in Georgia. Alfalfa introduction in the Eastern area was rather unsuccessful and by far the most important introduction of alfalfa occurred in the West. It was brought from Spain to the Spanish Americas. The introduction of seed from Chile to California in 1851 was considered to be the most important step in alfalfa growing in America.[1] From California alfalfa spread eastward first to Utah and into irrigated areas in Colorado.

From Colorado alfalfa came into Kansas, beginning to be an important crop about the year 1894.[2] At first it was grown along the Arkansas River but gradually it spread to nearly all parts of the state.

Old as alfalfa is in agricultural history, however, it did not become firmly established in the United States until after 1900. Since that time it has become the most important hay crop in the United States.

History of Production and Market Information

Very little data on production and value of seed is available prior to World War I. Shortly before World War I the Division of Crop and Livestock Estimates of the U. S. Department of Agriculture began to tabulate prices received by farmers for alfalfa and some other seeds. During World War I this

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[1] Wing, Joseph E., Alfalfa in America, p. 52.

[2] Ibid, p. 71.

Division started to make annual production estimates of alfalfa and other seeds. Series of prices and production figures are now published by the seed section of Field Crop Statistics Branch of the Agricultural Marketing Service and by the Federal-State Agricultural Estimates Offices of the various states.

Until 1939 no United States data was collected on supplies, carryover, exports and imports of alfalfa seed. In regard to production forecasts Dr. Frank V. Beck, Agricultural Economist for the Field Seed Institute of North America, in his detailed description of the development of seed statistics had this to say:

> The most complete data on the production of a given seed crop that can be obtained would be an enumeration of all farms growing it. Since it is impossible to take such a census annually the Agriculture Statistics Division of the Department of Agriculture obtains a partial sample enumeration each year on the basis of which it estimates total production by reference to the most recent complete enumeration made by the Bureau of the Census. In this way production can be estimated annually without undue expenditure of time and funds.
>
> Pre-harvest estimates of production or forecasts are also made each year for several kinds of seed. These are based on producers' replies to a questionnaire sent out by the Federal and State Department of Agriculture. A large number of growers are asked to report their acres of seed, actual or expected, and previous year's yield. From the reports of this sample of growers the total increase or decrease in acreage is estimated on the basis of the previous year's final estimates. Similarly yields are calculated on the basis of the known yield of the previous year. In this way acreage and yield are estimated for each state and for the United

States as a whole. By multiplying the expected acreage by the expected yield a forecast of the county's total production is made.[1]

Another aid in forecasting seed production is the field inspection. A trained man from the Federal Department of Agriculture travels through the seed producing area, stopping frequently to examine the set of seed in the fields along the roadside and talking with growers and shippers about crop prospects.

Study of Seed Industry in the United States

The most complete study related to alfalfa seed marketing was made by Frank V. Beck and reported in his book, The Field Seed Industry in the United States.

One of the important contributions of the work was the systematic compilation of production and price series (historical data which was pieced together from various sources of agricultural statistics, census, trade and private quotations) to make it available to the industry as well as the analysis of this material to make the meaning of this data more clear.

Another contribution of Dr. Beck's study was the collection of considerable new data by means of surveys of producers, threshermen, retailers and wholesalers in the seed industry.

Dr. Beck also gives some insights into the early development of the field seed industry in the United States indicated

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[1]Frank V. Beck, The Field Seed Industry in the United States, pp. 18-19.

that it developed somewhat differently than that of alfalfa seed production in that it spread from East to West.

Dr. Beck also gives a rather detailed history of the development of government seed statistics and forecasts. In the collecting of historical data on alfalfa Dr. Beck has prepared a series on hay and seed production from 1919-1940 as well as work on compiling wholesale price series based on the median of available quotations for the period (for Kansas alfalfa seed) 1909-1940. Prices at the producer level and retail level were also compiled by Dr. Beck and utilized in his comparisons of farm, wholesale and retail price relationship and regional variations.

In the line of new data, Dr. Beck collected information on the utilization of seed by means of what government information was available on disposition combined with his own surveys. By this means he was able to estimate the annual seed consumption by states and the net relationship between production and utilization (surplus or deficit) of each state. (This useful approach has apparently not been kept up to date.)

Also information on seasonal and geographical patterns of alfalfa seed sales which had not been compiled previously were published by Dr. Beck. Seedmen contacted by Dr. Beck supplied the information for compiling seasonal wholesale and retail sales patterns within various states. Dr. Beck also compiled an aggregate price index of field seeds which he utilized in comparison to other farm prices.

Included also is a description of some of the practices involved in the commercial movement and distribution of field seeds.

Indiana Seed Pricing Study

A study of prices of forage crop seed in Indiana was published by Morris White and Don Paarlberg of the Purdue staff in which they conducted analysis to determine and measure the factors most closely associated with Indiana price and production of important forage crop seeds including alfalfa.[1] In this study the authors analyzed the purchasing power, seasonal patterns and variability of various seeds. In the analysis of factors influence on seed prices in Indiana they found red clover prices as the most important single factor affecting price of other seeds. They also found that production was not significant in its effect on the price of alfalfa.

Illinois Seed Pricing Study

The study made by Herr and Jordan at Urbana in 1954 was devoted primarily to studying the economics of production, factors influencing prices received by farmers, seasonal price movements, and marketing margins of six legume and grass seeds in Illinois.[2]

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[1]Morris White and Don Paarlberg, "Prices of Forage Crop Seeds in Indiana", Agricultural Experiment Station Bulletin 535.

[2]Herr and Jordan, op. cit.

In their production analysis section they bring up to date (1939-48) analyses made by Dr. Beck for the decade 1929-1938.

In analysis of the factors influencing price they found gross farm income as the best measure of demand for forage seed. To account for substitution possibilities, a composite price of the five legume seeds including alfalfa was computed by totaling the value of the production of each of the five seeds and dividing by the total production of the five seeds in pounds.

Using available data the authors also made a study of marketing margins and the proportion of the retail purchasers' dollar which goes to the retailer, the wholesaler and the producer.

SURVEY STUDY

In reviewing previous marketing studies no information was found on either the description of or functions performed by the Kansas seed industry in the marketing of alfalfa seed. Because of the importance of this forage crop seed within the state a survey was undertaken in order to better describe the process of marketing of alfalfa seed.

SCOPE AND LIMITATIONS

Area

Due to limitations imposed by lack of time, facilities and finances it was decided to limit this study to only one area within the state. The Arkansas River Valley, one of the three

major alfalfa seed producing areas in Kansas, was selected for study. This area included alfalfa seed production on both irrigated and non-irrigated land. From the marketing standpoint the valley area is a rather natural trade territory with many transportation routes leading to the important assembly points in the valley.

In order to define a territory on a basis consistent with both production and the valley trade territory, the area studied was limited to the 16 counties adjacent to the Arkansas River. This area, referred to as the Arkansas Valley area, included: Hamilton, Kearney, Finney, Gray, Ford, Kiowa, Edwards, Pawnee, Stafford, Barton, Rice, Reno, Harvey, Sedgwick, Sumner, and Cowley counties.

Type of Marketing Firms

A further limitation of this study was made by the decision to limit the study to only those firms which both handled and processed alfalfa seed in the 1954 season. These limitations therefore excluded consideration of businesses who purchased alfalfa seed but did not process or were not equipped to process the seed. Also excluded were retail seed outlets who did not clean or process seed as well as seed firms which did not handle alfalfa seed. The processor approach to the description of alfalfa seed marketing was used in the assumption that the function of assembling, cleaning, refining, and pricing is largely centered in the processors. They are the firms who

have the facilities for cleaning and treating of the general run of seeds in order to provide a better product for planting.

Although the small assembly firms and small distributors were excluded in this study it must be noted that they play an important part in many localities in performing the functions of buying and selling of alfalfa seed. No attempt has been made to study handling of seed kept on farms or sold between farms.

Therefore, this portion of the study will consider the position and influence of seed processors in performing marketing functions including processing, between the grower and the users of seed.

SAMPLING PROCEDURE

A group of 18 alfalfa seed processors in the Arkansas Valley area were interviewed in conducting this survey. The sample of processors contacted was based on a combination of random and census methods. The 1955 Kansas Official Directory of the Kansas Grain and Feed Dealers Association was used as a source of names of firms who processed seed. There were 48 firms listed as seed processors in the 16 county area. These were divided into two groups for purposes of size comparison.

This breakdown was made on the basis of estimates by various agronomists, crop improvement association men and dealers who were acquainted with the area. Since there were only eight firms in the large volume category this group was handled separately and each firm was contacted.

Of the remaining group a random sampling procedure was suggested and 25 percent sampling of this group was taken on the theory that they constituted a homogenous population of small processors.

At this point another problem arose which necessitated the selection of random alternates. No accurate information was available to indicate whether or not the processors listed handled alfalfa seed and had been processing alfalfa seed in the previous year, 1954. An alternate sample was drawn to be used in cases where the original sample item did not conform to the requirements and where schedules were otherwise unable to be obtained. The following parts of this study are based on reports from 18 firms in the Arkansas Valley area.

ESTIMATION OF VOLUME OF TRANSACTIONS

Assuming that the 25 percent random sample of the 40 dealers not included in the census group was truly representative of that group it is possible to estimate the volume of seed handled by the firms in the area. On the basis of combining the census volume with an estimate of the population volume from which the random sample firms were drawn a total volume handled figure was computed. This total quantity handled figure, since it may include the same seed as it was sold from one firm to another several times, is more useful as a measure of the volume of transactions in pounds rather than a measure of the total quantity of seed itself.

The census group of eight firms accounted for 66.8 percent of this computed total volume of transaction while the other 40 firms in the population accounted 33.2 percent of the volume of business.

DESCRIPTION OF PROCESSORS IN STUDY

The dealers in this study were all located in the 16 county area of Kansas which is adjacent to the Arkansas River. However, there was a tendency for these firms to be located in the heavier seed producing counties.

Of the 18 firms surveyed only two were exclusively (or practically so) wholesale shippers of alfalfa seed. Most firms handled both retail sales locally and wholesale shipments of trucklots or carlots of alfalfa seed. Two of the firms contacted did not take title to the seed which they handled and marketed. These were co-ops which cleaned the seed for their farmer patrons and stored it for them until sold. They also helped the farmer find a buyer for the seed but only as a service of the organization. One dealer surveyed also reported that the only alfalfa seed handled in his 1954 marketing activities was seed carried over from the previous year since he purchased no 1954 crop seed.

There were five firms in the group which reported that they handled their wholesale activities in alfalfa seed on a commission basis. These firms operated as buyers for other firms and only took title to the small amount of seed needed to meet local

retail requirements. Only one of these firms handled over a carload of alfalfa seed in 1954.

Type of Business Organization

Classified according to type of business organization, the 18 firms studied were broken down according to corporations, cooperatives, partnerships and individual ownership type of business. Table 4 shows the number of firms in each classification.

Table 4. Classification of firms by type of business organization.

Type	Large firm group surveyed	Small firm group surveyed	Total surveyed
Corporation	4	4	8
Cooperatives	3	3	4
Individuals	2	2	4
Partnership	1	1	2

Other Business Enterprises

Only four firms surveyed were exclusively seed business enterprises--that is, seed business made up nearly 100 percent of the total business of these firms.

Most of the dealers contacted handled other sidelines along with the seed business or the seed business was a sideline carried along with their major enterprise. Feed business was the most frequent enterprise carried on in conjunction with seed

handling and was reported by 13 firms. Grain handling was second, being reported by 10 firms.

With the exception of two large grain elevators each of the dealers contacted that handled over one carload of alfalfa seed had a seed business volume which made up over 50 percent of their gross income.

CLASSIFICATION BY SIZE

For purpose of further classification, the data obtained from the two groups (census and random sample) surveyed was broken down into three size groups according to the quantity of alfalfa seed handled in 1954. The large firm group consists of the four firms each handling over 600,000 lbs. of alfalfa seed (equivalent to over 10 carloads).[1] The medium size group consists of reports of firms handling 60,000 to 600,000 pounds of alfalfa seed (equivalent of 1-10 carloads) and the small group, eight firms each of which handled less than 60,000 pounds (equivalent of one carload) of alfalfa seed during the period studied. Table 5 shows the average quantity handled by each group and the percent of the total handled by each group.

Two of the firms in the random sample made up almost 84 percent (83.6%) of the volume (pound basis) of the random group.

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[1]Based on dealers' estimates of 60,000 pounds as the average size of carloadings shipped to Eastern buyers. It was estimated that the average size car shipped to points within the Kansas and Missouri area was around 40,000 pounds.

Table 5. Average quantity of alfalfa seed handled by size groups.

Size group	Number of firms in group	Average quantity handled	Percent of survey handled
		lbs.	
Over 10 carload group	4	1,162,500	74.2
1-10 carload group	6	310,300	24.0
Less than 1 carload group	8	17,300	1.8
Large firm survey group	8	846,875	88.9
Small firm survey group	10	84,400	11.1

They were in the 1-10 carlot category and are included with the census firms of that size for purposes of comparison by size group.

ALFALFA SEED VARIETIES IN STUDY

The three major variety classifications of alfalfa seed grown in this area are Kansas common, certified Buffalo and non-certified Buffalo. Small amounts of Grimm and other varieties are grown in isolated areas by some farmers but in relation to groups they are so small that they were not considered in this study. Both Buffalo and Kansas common are approved varieties for seed production and are adapted in the same general areas. Since Buffalo is also grown in regions somewhat further North, part of the difference in price may be explained by its greater geographical area of demand than for Kansas common.

Buffalo seed is limited in the number of times it may be grown as certified seed. Farmers who plan foundation seed

produce registered seed which in turn may be planted to produce certified seed. Fields planted with certified seed are not eligible for re-certification. For this reason one would expect that there would be a greater proportion of the non-certified seed to be marketed than of certified seed.

Figure 9 shows the distribution between Kansas common, Buffalo and non-certified of slightly over five and one-half million pounds of alfalfa seed reported by 14 dealers and classified by the size of the seed firm.[1] Of the total reported 2 percent was certified Buffalo, 14.5 percent non-certified Buffalo, and 83.5 percent was Kansas common. This indicated that the larger firm group tended to handle a larger percent of the certified seed.

SEED MARKETING FUNCTIONS OF PROCESSORS

Marketing problems may be analyzed by any of three major approaches. These are the functional approach, the institutional approach and the commodity approach. All these are merely ways of breaking down a complicated marketing problem into its parts so that it can be better understood.[2]

Here we will consider the functional approach limited to the commodity alfalfa seed as handled within the institutional

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[1]Three dealers did not handle alfalfa seed in 1954 and one dealer did not report breakdown by variety classification.

[2]Richard L. Kohls, Marketing of Agricultural Products, p. 17.

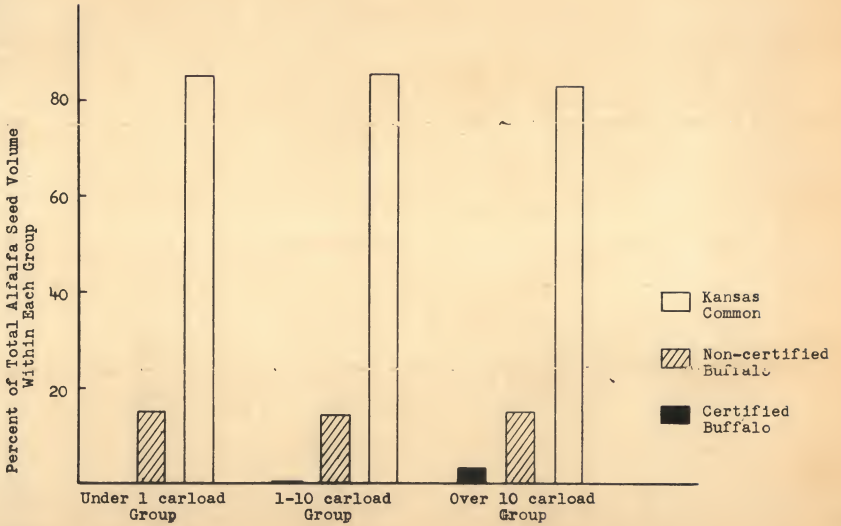

Fig. 9. Alfalfa seed: Percentage distribution of Certified Buffalo, Non-certified Buffalo and Kansas Common reported by dealer size groups, Arkansas Valley area, 1954.

framework of the merchant and agent middlemen described as alfalfa seed processors.

ALFALFA SEED BUYING

The buying function is largely one of seeking out the sources of supply of seed and the activities which are associated with collecting lots of seed produced by individual growers.

The means of purchasing alfalfa seed has been changing. In the early days prior to the development of rapid transportation and communication, seed buying was more a matter of the seller seeking the buyer. Farmers and county dealers then often sent samples of county run seed by mail to the larger seed buyers who then submitted their offers on the basis of the sample.

This method of buying seed has declined with the development of rapid truck transportation and telephone communication. Many firms now employ seed buyers to go to the producing area and purchase the seed required. These seed buyers can cover a wide production area and still keep in contact with the home office. Now the tendency is for the buyer to seek the seller.[1]

In the Arkansas Valley area several of the larger dealers send buyers out to the farm to purchase seed. One dealer reported that 80 percent of their alfalfa seed was purchased in this manner. Many of the smaller dealers do not maintain seed

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[1]Beck, op. cit., p. 16.

buyers although some make direct purchases at the farm when seed is needed in a hurry to meet a rush order.

From reports of dealers in the area studied, apparently very little seed was purchased in 1954 through offers submitted on the basis of samples sent in by mail. The most frequent method of purchase of a lot of alfalfa seed was by offers made on seed which had been brought in by farmers.

Method of Purchase

To determine how many of the firms purchase alfalfa seed on a dockage discount basis compared to a clean seed basis the dealers contacted were asked if they bought any alfalfa seed in 1954 on other than a clean seed basis.

Of the 10 dealers in the size groups over one carload, 50 percent reported that they bought on a clean seed basis only. By clean seed basis it is meant that the dealers buy the seed at a price quoted for a net weight of the seed after it has been cleaned. The farmer usually can have the cleanings back to feed on the farm if he desires, though one dealer interviewed still had unclaimed cleanings on hand from last year.

One seed man reported that he purchases on a clean seed basis only but since he used only a screen machine he charged dockage for material which could not be removed on his screen cleaner. Two other dealers in the 1-10 carload size group reported buying on other than clean seed basis but one of these reported that most purchases were on a clean seed basis.

Three of the four dealers in the over-10-carload size group bought on the dockage basis although one of these three reported buying on a clean seed basis also. Dockage is determined by use of a grader and scales. The most common used dockage grader is a small machine with velvet rolls which removes all foreign matter, immature seed, dodder and foxtail seed from the sample. One dealer reported that he can come within one to two percent of the actual clean-out by the dockage method.

Seed Purchases from Farmers by Size Groups

In 1954, 65.8 percent of the Kansas grown alfalfa seed purchased by the dealers in the over-10-carload size group was bought directly from farmers. In the size group 1-10 carloads, purchases from farmers made up 85.5 percent of the seed purchased. Firms in the under-1-carload size group purchased nearly 99.9 percent of their alfalfa seed from farmers. This points out the concentration (assembly function) of quantity of seed which is necessary for wholesale distribution and sale of alfalfa seed in Eastern market areas.

Size of Lot Purchased

Reports on the purchase of alfalfa seed by 11 firms which handled a total of nearly five million pounds of alfalfa seed (4.93 million pounds) indicated that the average lot of seed purchased from farmers was 3,370 pounds.

Monthly Distribution of Purchases

Reports on the monthly distribution of purchases of two million pounds alfalfa seed reported by five dealers indicate that nearly all of the seed purchases are made at harvest time. During the months of August, September and October, 90.1 percent of the total was purchased by these firms in the 1954 season. Figure 10 shows the monthly distribution of purchases as a percent of the total 1954 season purchases (July 1954-June 1955).[1]

Since most of the purchases are made at harvest time, it was indicated that farmers tend to market their alfalfa seed immediately at harvest and only a small percent for later marketing. There are several reasons which may explain why producers market alfalfa seed early.

1. The seasonal price change may not be pronounced enough to make it profitable for the farmer to store the seed for a higher market in the spring.

2. Alfalfa seed may make up such a small proportion of each grower's income that any gain from holding the seed would not significantly increase his total income.

3. The high risk of price fluctuations which farmers would have to take in holding the seed may outweigh the advantages of an average seasonal price increase.

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[1]Monthly figures on seasonal distribution of marketing were reported by five firms. Other reports were by quarters and were not included in calculating these distributions.

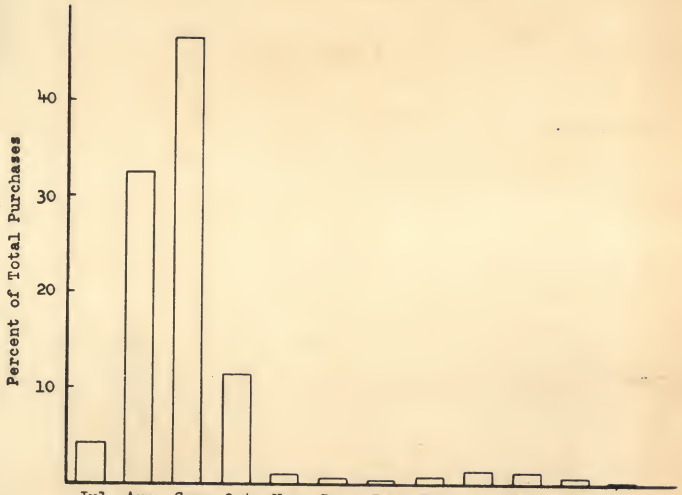

Fig. 10. Alfalfa seed: Monthly distribution of purchases, Arkansas Valley area, 1954 season.

4. Alfalfa seed may be produced as a cash crop in dry seasons or drouth periods when other farm income is decreased and the demand for cash to meet expenses necessitates the early marketing of the seed.

ALFALFA SEED SELLING

The selling operations of the processors interviewed are those activities which were performed to dispose of the seed at satisfactory prices by making it available to prospective wholesale and retail purchasers in the desired quantity and quality. Such activities involved in meeting requirements of the market are called "merchandising."[1] The merchandising operation of the firms can be broken down into wholesale and retail activities. Wholesale merchandising of alfalfa seed was by far the most important in this area since this was a rather specialized production area. Of reports of nine firms handling almost five and one-half million pounds of alfalfa seed only five percent were retail sales back to farmers. For comparison, the only available figure on a retail sales percentage for the entire state of Kansas was a study of the three years 1939-41 made by Dr. Beck in which 21 to 37 percent of the seed produced were retail sales.[2]

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[1]Fred E. Clark and Carrie P. Clark, Principles of Marketing, p. 27.

[2]Beck, op. cit., p. 72.

Size of Lots Merchandised

The dealers contacted reported that the average size lot sold to farmers was 182 pounds. Some dealers merchandise their retail seed in 60 pound bags (1 bushel) since the farmers bought seed in such small lots that it was a handier unit than a 100 pound or 150 pound bag which might have to be broken to meet the farmers' needs.

Wholesale sales on the other hand are merchandised in lots of a truck load or a carload usually since they must move long distances to other dealers. The larger dealers tend to ship lots by rail while the smaller dealers often ship truck lots. Reports from dealers in the over 10 carlot size group indicated that the average size wholesale lot was 42,920 pounds while for dealers in the 1-10 carload size group, the average size wholesale lot was 28,250 pounds. Small dealers handling less than one car sold wholesale in lots averaging 19,700 pounds.

Since the average size lot purchased from farmers was 3,370 pounds several purchases must be bulked together by the dealers before he can merchandise a wholesale lot. This involves considerable record work on verification of origin of the wholesale lot.

Sales Patterns

The monthly distribution of sales also differs quite widely between wholesale and retail merchandising. According to Dr. Beck's study of United States sales pattern in the 1939-40 season, the United States retail peak sales was in April

with a smaller peak occurring in August and September. However, the peak in United States wholesale sales occurred in November with secondary peaks in August and again in April.[1]

Reports on retail sales of approximately 100,000 pounds of alfalfa seed by Arkansas Valley dealers in the 1954 season indicated that the peak sales (Fig. 11) occurred in September with a secondary peak in April. The three main planting months, September, August, and April, accounted for 82.4 percent of the retail sales.

In Kansas the recommended planting dates are from August 15 to September 10 in northern Kansas and August 15 to September 20 in the Arkansas Valley and other southern Kansas areas. Spring seeding varies from the first of April to the last of May in Kansas.

The distribution of wholesale sales of alfalfa seed reported by Arkansas Valley processors indicated that the peak wholesale sales occur in August and September coinciding both with seed harvest and the early Eastern wholesale demand for fall planting.

Early harvested seed often can command a good market for that season's planting if it is available by the planting time. Several dealers reported they try to get early harvested seed on the market ahead of the United States peak seed harvest.

There were also a secondary peak in wholesale sales in November, the month indicated by Beck's study of the United

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[1]Beck, op. cit., p. 82.

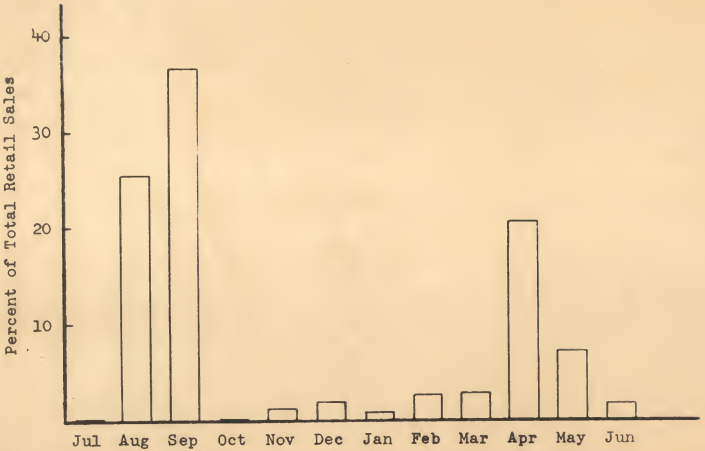

Fig. 11. Alfalfa seed: Monthly distribution of retail sales, Arkansas Valley area, 1954 season.

States sales as the primary peak. A small Spring secondary peak occurred in March also, probably influenced mostly by retailers' demand for stocks before Spring seeding time. Figure 12 shows the monthly sales pattern based on approximately 1,900,000 pounds of wholesale alfalfa seed sales by Arkansas Valley processors in the 1954 season.

In interpreting the graphs on purchases and sales included in this section it should be borne in mind that they are based on data of a few firms for a single year. Their pattern of sales might not be exactly the same in a year in which the weather and other factors were different. Also they are limited to one area in which production and marketing methods may differ from other areas. However, this information gives some indication of the patterns.

Wholesale Sales Area

No information is available on the quantity of Kansas seed used in other states. Buffalo and Kansas common are both adapted in the states having approximately the same latitude as Kansas and those areas southeast of Kansas. Buffalo is also grown in regions somewhat further north. The chief seed consuming states in the medium hardy area to the east of Kansas were Missouri, Illinois, Indiana, Ohio, Kentucky, Tennessee, Virginia, Pennsylvania, Maryland and New Jersey, when Beck made his 1939-42 study.[1]

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[1]Beck, op. cit., p. 69.

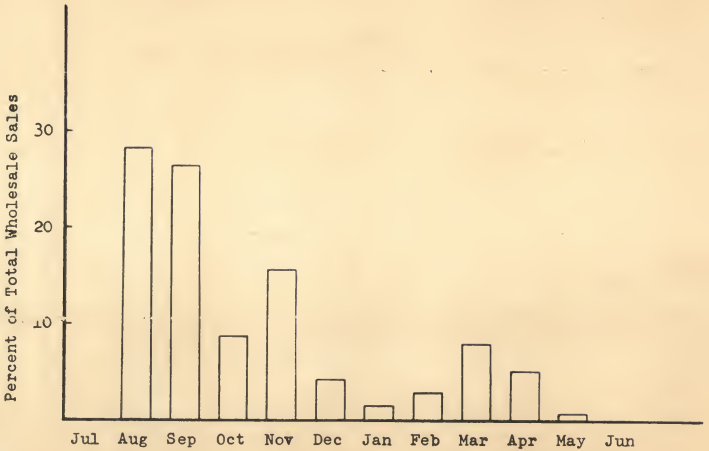

Fig. 12. Alfalfa seed: Monthly distribution of wholesale sales, Arkansas Valley area, 1954 season.

Dealers surveyed in the Arkansas Valley reported wholesale sales to buyers in nearly the same consuming areas as well as some sales of seed, especially the hardier Buffalo, to areas as far North as Iowa, southern Wisconsin, southern Michigan and New York. Missouri, Illinois, Indiana and Ohio were the most frequently named states to which Kansas seed was shipped.

FINANCING AND RISK BEARING

Financing is the advancing of money to carry on the various aspects of marketing such as costs of the purchased seed and the assembling, processing and distributing costs.

There is a very large financing cost involved in handling alfalfa seed since the per pound value is very high. Also as was noted, the harvesting of the seed takes place in the late summer or early fall but since farmers sell most at harvest much of this seed must be carried by seed men to Spring for the Spring planting season when most is used, or be carried over for the next season's late Summer planting. The nature of the marketing season of alfalfa seed compared to its production season, therefore, makes it necessary that firms handling and processing this seed must have large amounts of capital and bank credit to perform this heavy task of carrying the seed between harvest and planting.

The difference between harvest and the distribution season has also been the source of one of the most important problems of the seed industry which is market risk. When price levels

change sharply between these two periods the results may be large profits or heavy losses. Thus the carrying of large quantities of valuable seed entail a certain element of risk.

The market risk involved in seed handled cannot easily be shifted as it can in commodities with organized futures trading where an operator can shift risk through hedging operations.

A practice used by the seed business to reduce some of the risk of price fluctuations is the method of advance booking. Soon after the season opens (early in the fall) some of the wholesalers, for protection against losses, begin booking their outlets for the requirements of the next planting season. These bookings may be for shipment shortly after the seed has been processed or they may be what are known as "spring bookings", that is commitments to ship just before planting time.

Reports from dealers surveyed indicate that the quantity of alfalfa seed sold on advance bookings varied from none to as high as one-fourth of the sales of some firms in 1954. The bulk of these sales were short-term bookings for delivery within three months or less.

STORAGE AND TRANSPORTATION ACTIVITIES

The seasonal nature of the seed business also creates problems in the physical storage of seed such as alfalfa seed. Warehouse space and handling equipment is necessary for handling the seed until the marketing season. Unlike the commercial storage of the grain industry, seed storage is almost entirely the firm's own inventories. In the survey only five firms

reported storing seed for other people and four of these were co-op elevators who stored for their farmer members only.

Some processors enter into transportation services in their seed business also. Nearly half of the larger dealers surveyed reported offering truck services to pick up seed at the farm. Some large dealers also have their own trucks for long distance movement of seed to wholesale buyers although the bulk of the wholesale movement of seed from this area was moved by rail.

The chief advantage reported of truck shipments was the time advantage. Trucks are often employed when it is necessary to meet a special order. Since most of the seed must move long distances the rail method of shipment has been used most.

PROCESSING

The part played by the processors in the seed industry is very important. Besides performing the marketing functions noted above, the processor also performs the service of converting the county run seed into a cleaner higher quality seed which is desired by the grower for planting. By a combination of skillful cleaning and merchandising, processors can offer the type of seed which farmers are demanding.

Functions of Cleaning Machines

The two main objectives in cleaning of alfalfa seed are (1) to remove foreign material, chaff, straw, dirt, other crop seeds and weed seeds and (2) to obtain a uniform size group by

removing immature seed. Some difference must exist between alfalfa seed and this material before mechanical seed cleaning can be effected. The principal seed selection characteristics on which the three types of cleaning machines are based are size, shape, specific gravity and surface characteristics.

The screen type of cleaner, the most commonly used machine, sorts on the basis of a combination of size, shape, and specific gravity. The oscillating screens or seives of the machine sort by size and shape while the air blast from the fans separate on the principle of the specific gravity of the particles.

The specific gravity type of separating unit consists of an oscillating perforated deck covered with a canvas fabric. The inclined deck oscillates in such a way that the heavy and light particles move laterally out of the normal flow. This is accomplished by air moving through the deck which agitates the seed producing stratification of the material according to the density of the individual particles. The heavier seeds sink through the mass until in direct contact with the deck surface and are then moved in the direction of oscillation to the outlet on the upper discharge end of the deck. The lighter material loses contact with the deck and therefore gravitates or floats more rapidly toward the lower discharge end. The material leaving the deck is collected by a series of spouts

along the discharge end, the specific gravity of the lots increasing from the low side to the high.[1]

The third type of machine frequently used in cleaning alfalfa seed is the velvet rolls or dodder mill type of machine. This machine separates on the basis of surface characteristics of the material. There are several variations of this machine manufactured. In general they operate on the principle of passing a stream of seeds to be cleaned along two tilted rotating rolls turning in opposite directions. One or both of these rolls are covered with a specially selected velvet-napped surfacing. The friction of this surface throws rough-coated weed seed, immature seed, and foreign material out of the stream and into the discard channel. The smooth alfalfa seeds are not picked up by the rolls and pass rapidly along the roll channel and fall into the clean seed discharge outlet at the end of the rolls. There are usually six or more pairs of these rolls in a unit.

Cleaning Equipment Used

In processing alfalfa seed nearly all (except one) of the size group handling over 10 cars (600,000 pounds) of alfalfa used a combination of three types of seed-cleaning machines and all used a combination of at least two machines. Of the 1-10 carload size group two-thirds had dodder mills and

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[1]Roy Baines, R. A. Kepner and E. L. Barger, Engineering Elements of Farm Machinery, p. 164.

one-half of them also used gravity separators as well as screen cleaners. The smaller firms used only multiple screen mills in processing the seed.

Some seed men consider that it takes a combination of all three of these machines, the screen cleaner, gravity and dodder mill, to obtain high quality, high purity seed. The standard purity for high-quality seed is considered to be 99.25 percent.

Importance of Alfalfa Seed in Seed Processing Volume

Reports of the dealers in the size groups over one carload shows that on a per pound basis, (omitting seed wheat cleaning but including grain sorghum seed processing) 49 percent of the seed processed by the nine dealers reporting was alfalfa seed. This was broken down into the group over 10 carlot size which had an average of 46.6 percent of the total volume (in pounds) as alfalfa seed compared to the 1-10 car group with an average of 58.3 percent of the seed processed being alfalfa seed.

Dealers in some areas reported that almost 50 percent of the seed processed was grain sorghums and in other areas sweet clover ranks highest making up almost 60 percent of the total quantity processed.

Percent Cleanout

The average of the reports on cleanout reported by 14 dealers as a percent of all alfalfa seed purchased was 15.5 percent. Fifteen dealers estimated that the cleanout loss of seed purchased direct from farmers averaged 16.2 percent of

the total farm volume for 1954. Dealers reported that seed bought from other dealers varies from guaranteed seed (99.25 percent purity) to seed which has 3 to 5 percent cleanout depending on the type of cleaning equipment used.

For example one processor reported that he got another 5 percent cleanout of alfalfa on the dodder mill after going over the screen machine. The percent cleanout reported by dealers for 1954 may also be lower than usual since many considered that year's crop to be of high quality.

Custom Rates

Custom cleaning was an important service performed by many of the dealers. Only two dealers, who were wholesalers, interviewed in this area did not do custom cleaning.

Most of the dealers were equipped to do a better job of cleaning seed than were most farmers. As was noted nearly all of the larger processors are equipped with a combination of cleaning machines which the producer could not afford. Also the multiple screen machines themselves are more efficient cleaning machines than are the small two screen machines which most producers would otherwise use.

Some custom operators charge on the basis of clean seed, others charged on the basis of gross weight. The most frequent quoted charge was $1.00 per hundredweight, sometimes on clean seed, sometimes on gross weight basis for cleaning over a multiple screen mill. An additional charge was made when seed was further processed over the gravity separator or dodder mill.

The average charge for cleaning over a screen mill adjusted to a clean seed basis was 89.9 cents per hundredweight. Five dealers reported rates for cleaning over a combination of cleaners averaging $1.39 per hundredweight on a clean seed basis. Adjustment to clean seed basis was made by converting bulk seed quotation to clean seed on the basis of the 16.2 percent average farm cleanout calculated from dealers' reports of 1954 cleanout.

PROBLEMS OF SEED DEALERS

In order to obtain information on what the dealers themselves considered the major problems confronting them in the marketing of alfalfa seed, all were asked what they considered these problems to be. These problems were grouped into problems dealing with wholesale and retail sales, market risk production and marketing information, and processing operations. The most frequently reported problems were as follows:

1. Wholesale sales. This problem arises due to the absence of an organized market for alfalfa seed. Each firm must keep in personal contact with a good many distant wholesale outlets in order to secure a good market. This means a rather high cost is involved in telephone, telegraph and travel expenses.

2. Retail sales. Weather factors in local retail areas influence greatly the retail market for seed in a given season.

3. Market risk. Dealers who carry seed from harvest to planting time must consider the uncertainty of price movements

of alfalfa seed. Uncertainty of price is greatly increased when seed must be carried over from one season to the next. Carryovers of high-priced seed can be a real problem if there is a heavy seed crop the following year. Since there is no organized market, risk cannot be shifted by hedging as in the grain trade. The lack of a central market leads also to difficulty at times for dealers to determine when the market for seed is changing. Since they have limited contacts, movements by individual firms may influence the market to a greater extent at times than the amount of transactions would warrant. For example, it is difficult at times to tell if firms are bidding up on shipments of seed due to changed supply and demand conditions or if the bidding is to get seed in a hurry to fill a special order.

In regard to quality risk it was noted by one dealer that seed laws have helped both the farmer and the dealer by reducing quality risk and increasing confidence in the quality of seed marketed through seed trade channels.

4. Production and market information. Dealers indicated a need for more information on both production and marketing phases of the alfalfa seed business. Sources of market information are very limited. Kansas dealers try to anticipate the supply of seed mainly by keeping in contact with Kansas producers. On the utilization side, Eastern dealers keep in touch with the Eastern farm situation to determine about how much is going to be planted. Telephone contacts between Kansas

dealers and Eastern dealers are an important factor in the exchange and dissemination of seed information. One dealer felt that Kansas dealers were at a greater disadvantage than Eastern seed dealers due to the lack of market information since Kansas dealers have fewer opportunities to estimate demand factors than Eastern dealers have of estimating Western seed production.

5. Processing. Dealers indicated that the most important alfalfa seed processing problem was the removal of weed seeds such as dodder and foxtail. Dealers who were not equipped to remove these weed seeds had to discount the purchase price of alfalfa seed containing these weeds because of the decreased sales value of such seed.

PRICING CONSIDERATIONS

As an indication of the factors influencing purchase price, the question was asked, "What factors are considered in purchasing alfalfa seed?"

Current market prices were reported as the main consideration in establishing the purchase price. Buyers on commission, of course, purchased on the basis of a current price quoted by the wholesaler. Since a large proportion of alfalfa seed was sold within three months after harvest in this area the current market price, which was arrived at through contacts with other firms and Eastern wholesalers, appeared to be the main base for setting a purchase price. Most of this is done by telephone

since there is no organized method of obtaining correct information on the demand situation except by offers from buyers.

Other factors reported influencing the price paid for alfalfa seed were mixture with other legumes and noxious weeds. Sweet clover was no problem in most areas but some dealers reported they didn't buy alfalfa containing sweet clover. Those dealers who do buy alfalfa containing sweet clover must either find as a buyer someone who will want such seed for purposes such as pasture planting, or be able to bulk the seed with other. Either way the seed price would be discounted.

Hulled Johnson grass in alfalfa seed is another factor which discounts the value of seed greatly. Some firms do not buy seed containing Johnson grass and it is necessary for those who do purchase it to sell it to Northern outlets where Johnson grass winterkills and therefore is not noxious. The value of medium hardy alfalfa is also lower in these areas due to the short life of a stand.

Three dealers stated that weed seeds such as foxtail and dodder and immature seed is not much of a price problem if the alfalfa seed is purchased on a clean seed basis by a firm with a dodder mill and gravity type separator. Since some alfalfa is lost in the process of removing the weed seeds on a dodder mill, a price discount of approximately $2.00 per hundredweight was reported by two dealers who purchased seed on a dockage basis.

The differentials in purchase price between Kansas and Oklahoma seed showed that origin is also a factor in influencing price. There appeared to be a differential of $1 to $3 between the higher priced Kansas origin seed and seed from northern Oklahoma.

Federal information gathered on the seed production and supply are also utilized to try to estimate what the price will be. Also some dealers make use of the quotations published regularly by large seed houses to determine an average price to offer.

Many of the dealers expressed both the need for more current market information readily accessible from reliable and unbiased sources and also an interest in the causal forces underlying alfalfa seed prices in Kansas.

Since there was very little published information available on prices and bases for prices it was decided to investigate some of the factors which influence prices of alfalfa seed.

SEASONAL PRICE MOVEMENT

The production and marketing of agricultural products, due to the biological factor involved, tends to be seasonal in nature. This seasonal nature of agriculture has also led to seasonal movements in the price of agricultural products, so that prices tend to repeat themselves each year with a seasonal similarity.

Alfalfa seed is not only seasonal in production, but also seasonal in use. A study of the seasonal movement of alfalfa seed prices are of value to both the producer and the processor. The grower can use such information to compare storage costs and costs of holding (risking) the seed to the expected higher price and determine whether it will profit him to hold for later marketing. The seasonal index can also be of use to the alfalfa seed dealer to indicate to what degree seasonal prices of farm seed may affect his purchase policy.

As a measure of seasonal movement the index of average seasonal variations of prices received by farmers for alfalfa seed in Kansas from 1913 to 1954 inclusive was computed.

This index was computed from original mid-month prices by calculating a 13 month moving average to remove the trend and then expressing the original value for each month as a percentage of the moving average for the corresponding month. The resulting percentages were then averaged for the individual months. This average is the index of the average seasonal for that month.

Waite and Cox[1] indicate that this method of trend removal is the procedure most likely to remove all factors except the seasonal element from a series.

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[1]Warren C. Waite and Rex W. Cox, "Seasonal Variations of Prices and Marketing of Minnesota Agricultural Products, 1921-1935", Minnesota Agricultural Experiment Station, Technical Bulletin 127, March 1937, p. 1.

Figure 13 shows the average index of seasonal variation of prices received by Kansas farmers for alfalfa seed. The range of variation was rather narrow. The index of variation reached its low of 95.1 in November and then rose gradually to a high in April of 104.5. The variation between the high and low months was 9.4 points. This range can be taken as a relative measure of the seasonal movement from November to April.

The second aspect of measuring seasonal price variation applied to alfalfa seed was the index of irregularity. This is a measure of the extent to which individual cases failed to reflect the average seasonal pattern. Like most farm crops alfalfa seed prices exhibit erratic and unpredictable price movements.

The index of irregularity is the average deviation of the percentage of trend for particular months about the value of the index of average seasonal variations for that month. A band of the size of the index on either side of the index of average seasonal variation includes approximately 60 percent of the individual years comprising the average. A narrowing of the band indicates a greater conformity to the average seasonal pattern.[1]

On Figure 13 the index of irregularity has been shown as the shaded band on either side of the average seasonal.

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[1]Waite and Cox, op. cit., p. 127.

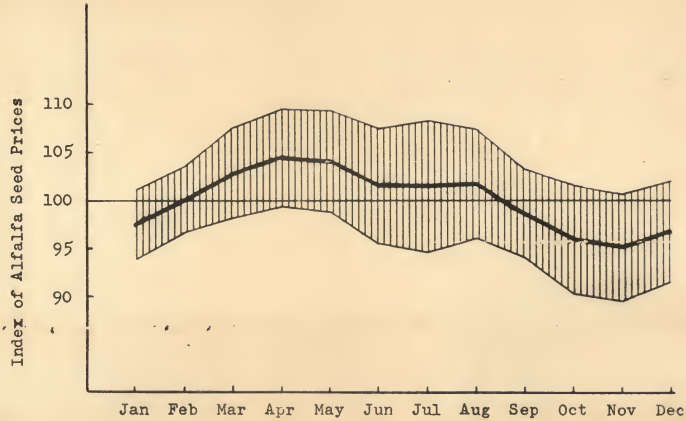

Fig. 13. Index of average seasonal variation in prices received by farmers for alfalfa seed in Kansas, 1913-54.

The index of irregularity shows a variation of 3.4 to 6.9 with an average of 5.2 (Table 6). This band indicates the non-conformity to the seasonal pattern. Since the base line 100 lies entirely within the shaded portion, it indicates that while there is an average seasonal movement present, there is little expectation that a movement similar to this average seasonal will be realized in a particular year. Another indication of this is the relatively small ratio (1.8) of the range in average seasonal variation to the average index of irregularity. When this ratio is small it indicates that the average seasonal pattern rarely appears in an individual year.[1]

The number of times prices were higher or lower from the preceding month may also be taken as an indication of the probability of an underlying seasonal movement of the actual price at a given time of year. This is based on the hypothesis that without an underlying tendency for seasonal movement the values would be equally higher or lower. The months of December through May as well as the month of August showed a greater number of times up than down from the preceding month. The remaining months of June through November showed a greater number of times down than up which also conformed to the average seasonal

An actual count was also taken of the number of times a particular month was high or low of the year. During the

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[1] Waite and Cox, op. cit., p. 5, reported that for farm commodities they studied the ratio varied from 7.4 to 0.7. For corn it was about 2.6.

Table 6. Average seasonal movement of alfalfa seed prices received by farmers in Kansas, 1913-1954.

Month	Average seasonal		Times H. or L. in 42 years[1]		Monthly movement[2]	
	Index of seasonal var.	Index of irregularity	Times month high of year	Times month low of year	Times up from preceding month	Times down from preceding month
January	97.5	3.7	3	16	23	15
February	100.0	3.4	3	5	27	9
March	102.9	4.7	5	1	26	8
April	104.5	5.0	8	0	23	12
May	104.1	5.3	6	0	20	16
June	101.5	6.1	2	1	9	30
July	101.4	6.9	4	3	14	20
August	101.7	5.7	4	0	23	16
September	98.6	4.6	0	1	16	25
October	95.9	4.7	1	6	13	27
November	95.1	5.6	3	8	19	21
December	96.8	5.2	9	9	25	13
Total	100.0	5.2	48	50	238	212

[1]If two months were equal in price, and were high or low, both were entered.

[2]No entry made for month of no change from preceding month.

period 1913-1954, Table 6 shows that 11 months out of the year rated at least one high. September was the only month not showing a high. December and April were the two months representing the greatest number of times high. Times a particular month was low also is of some help in indicating seasonal variation in prices.

There were three months (April, May and August) that did not represent a low month of the years in this series. January was the month representing the most lows of this period. October, November, December, January, and February represented the five most frequently low months.

Table 7 summarized the number of times between January 1935 and December 1954 that prices have been higher after a given month. Suppose a grower has harvested a crop of seed and has to decide whether to sell it or wait for better prices. It might help him to know how many times spring prices have been higher than harvest season prices. For example if a farmer harvested his seed in September (the average date of harvest of Kansas alfalfa seed in 1954 was September 3) the table indicates that March and April prices have averaged above September price 58 percent of the time.

Now suppose a grower manages to harvest his seed crop a month earlier so that he can either market it in August or wait until spring. What are his prospects for a price advance? Table 7 shows that March and April prices have averaged above the August price only 42 percent of the time. Therefore it

Table 7. Alfalfa seed, prices received by Kansas farmers, percent of times price went up from base month to subsequent month, January 1935-December 1954.

Base month	Subsequent month																							
	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
January	75	90	95	85	60	65	65	65	65	60	55	47											
February		60	75	70	40	35	55	60	50	55	50	47	58										
March			50	50	30	30	55	50	45	55	50	47	53	53									
April				35	20	25	40	50	45	45	40	42	58	58	53								
May					20	25	45	40	35	45	45	42	47	42	42	42							
June						40	50	50	45	45	45	53	58	58	58	53	32						
July							65	65	50	50	50	47	63	68	74	63	37	42					
August								35	35	35	40	37	42	42	42	47	32	37	53				
September									35	25	40	37	63	58	58	58	37	42	63	58			
October										60	55	68	79	74	74	74	68	68	68	63	63		
November											60	63	79	79	74	79	63	74	68	63	68	68	
December												47	74	95	90	84	53	74	68	63	63	63	63

appears that the price has been higher in August than the following Spring a greater number of times during this period.

Tables 8 and 9 complement Table 7 and record changes in price downward and times prices were the same in relation to a given month.

FACTORS INFLUENCING TREND IN ANNUAL PRICE

Compared to other annual average prices Kansas farmers receive, alfalfa seed prices apparently have fluctuated about as much as wheat and corn prices. An important difference is that on a bushel basis the price fluctuation in absolute magnitude is much greater due to the high value per unit. An examination was made to determine if there were local factors associated with the price fluctuation of Kansas alfalfa seed which might provide an explanation of this price movement.

Relation of Seed Price to Price Level

The index of prices farmers received for farm products in the United States was used as a measure of the price level. The price level which usually has a large effect on prices of most farm commodities was relatively unimportant in its influence on yearly average prices received for alfalfa seed by Kansas farmers. As shown in Figure 14 the price level to some extent determines the general level about which the price of alfalfa seed will fluctuate. The relation of seed prices to price level for the period 1921-1954 indicated a correlation coefficient of $\pm .168$. A correlation of this magnitude was not

Table 8. Alfalfa seed, prices received by Kansas farmers, percent of times price went down from base month to subsequent month, January 1935-December 1954.

Base month	Subsequent month																							
	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
January	5	5	5	15	35	30	35	35	40	40	45	47											
February		15	25	25	55	60	35	40	50	45	50	53	37										
March			35	30	65	65	45	35	50	45	50	53	47	47									
April				40	70	75	60	45	55	55	60	58	47	42	42								
May					75	70	50	55	60	55	55	58	47	53	53	58							
June						45	45	45	55	55	55	47	42	42	42	47	68						
July							30	35	50	50	50	47	32	27	26	37	53	58					
August								65	65	65	60	63	47	58	58	53	68	63	47				
September									65	65	60	58	37	37	37	42	53	58	37	37			
October										40	35	26	21	26	21	26	26	26	32	37	37		
November											30	32	21	11	16	16	26	26	32	32	32	32	
December												37	21	0	5	11	26	21	32	32	37	32	37

Table 9. Alfalfa seed, prices received by Kansas farmers, percent of times price of base month was the same as subsequent month, January 1935-December 1954.

Base month	Subsequent month																							
	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
January	20	5	0	0	5	5	0	0	0	0	0	5											
February		25	0	5	5	10	0	0	0	0	0	0	5										
March			15	20	5	5	0	15	5	0	0	0	0	0									
April				5	10	0	0	5	0	0	0	0	0	0	0								
May					5	5	5	5	5	0	0	0	5	5	5	0							
June						15	5	5	0	0	0	0	0	0	0	0	0						
July							5	0	0	0	0	5	5	5	0	0	10	0					
August								0	0	0	0	0	11	0	0	0	0	0	0				
September									0	10	0	5	0	5	5	0	10	0	0	5			
October										0	10	5	0	0	5	0	5	5	0	0	0		
November											10	5	0	11	11	5	11	0	0	5	0	0	
December												16	5	5	5	5	21	5	0	5	0	5	0

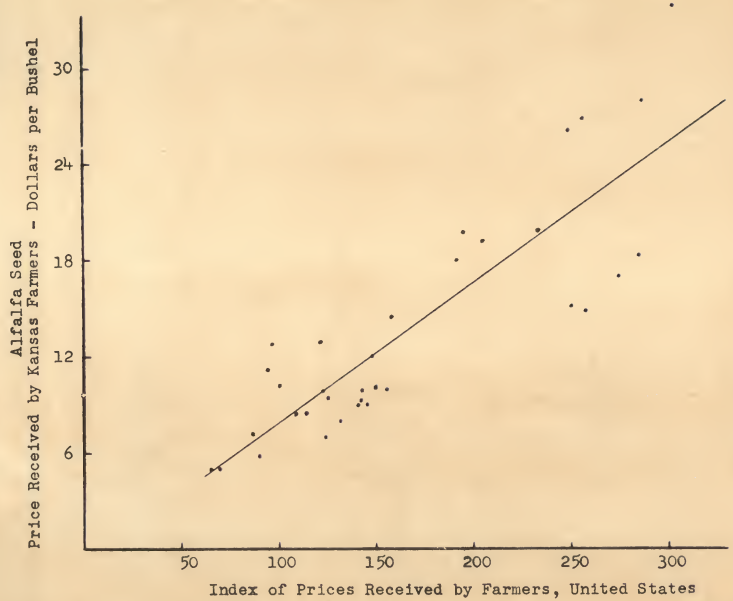

Fig. 14. Relationship of alfalfa seed prices received by Kansas farmers to the index of prices received by farmers, United States, 1921-54.

significant beyond the five percent level and indicates very little relationship between the two series.[1]

Relation of Seed Price to Wheat Price

In Kansas agriculture wheat and alfalfa are, in the major seed production areas, strong competitors from the supply standpoint in that both compete for land use. Therefore, perhaps a better understanding of this competitive relationship can be obtained by the study of this type of correlation. It would be expected that as the price of wheat increases bringing with it some response in increased acreage planted to wheat the effect might be a decrease in alfalfa acreage which through influence on decreased production may in turn influence an upward movement in seed price due to the decreased supply.

Figure 15 shows the relation of alfalfa seed prices received by Kansas farmers to the price of wheat received by Kansas farmers for the period 1939-1954. The coefficient of correlation obtained was $r = .67$ which was significant beyond the one percent level. This indicates a close association between the price of alfalfa seed and the price of wheat in Kansas.

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[1] For the test of significance reference was made to Statistical Methods, by G. W. Snedecor, p. 1949.

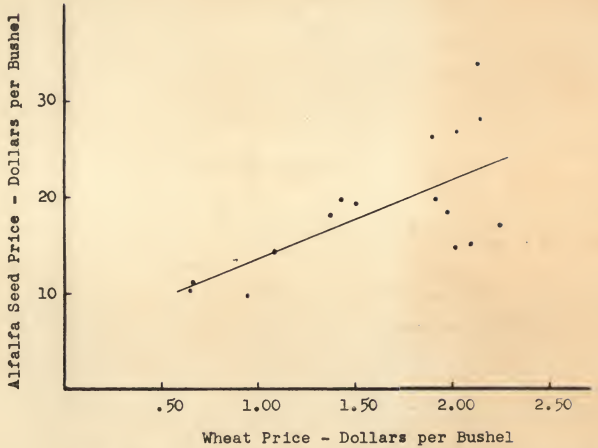

Fig. 15. Relationship of alfalfa seed price received by Kansas farmers to wheat price received by Kansas farmers, annual average prices, 1939-54.

Relation of Seed Price to Hay Price

Since alfalfa hay and alfalfa seed, under the conditions in which they are produced in Kansas, are to some degree competitive products,[1] it would be expected that the price of hay would be a factor affecting the price of alfalfa seed.

The two price series, alfalfa hay and alfalfa seed were correlated on the basis of annual average prices received by farmers for the period 1939-1954. Figure 16 shows this relationship which has a correlation coefficient of $\pm .50$ which is significant but not highly significant. This would indicate the probability of some degree of association between seed price and hay price.

Relation of Seed Price to Production

Previous studies of alfalfa seed prices in Indiana have found that United States alfalfa seed production was not significant in its effect on the Indiana prices of alfalfa seed.[2] The Indiana study indicated that there may have been some tendency of their relationship to be positive. This association between price and production may be due to chance or it may be due to the effect of price on production rather than

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[1] See section on production analysis dealing with seed-hay production.

[2] White and Paarlberg, op. cit., p. 16.

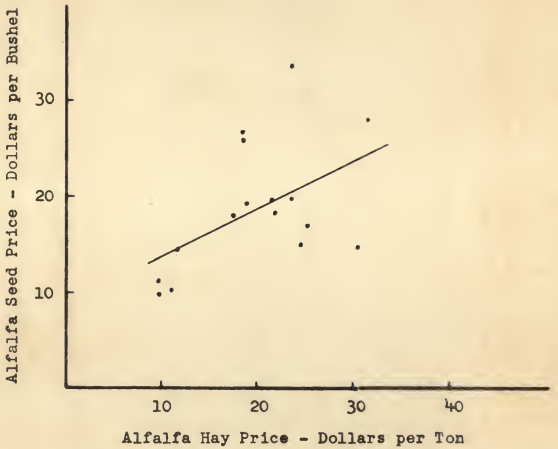

Fig. 16. Relationship of alfalfa seed price received by Kansas farmers to alfalfa hay price received by Kansas farmers, average annual prices, 1939-54.

production on price, which would have a negative influence. In any case the relationship between production and price of alfalfa was obscure.

In studying the effect of Kansas production on price, the prices were deflated to account for changes in general price level. This was done by dividing the annual average prices by the index of prices received by United States farmers to get a price series which would more nearly represent the price movement with the influence of changes in the general price level removed. From visual observation of Figure 17, which compares Kansas annual production to deflated average prices received by Kansas farmers for alfalfa seed, there appears to be no observable effect of production upon price.

RELATION TO RETAIL PRICE

Since it is considered that wholesale and retail margins of middlemen tend to be rather stable, it would be expected that the relationship between prices received by Kansas farmers for alfalfa seed and prices paid by all farmers for alfalfa seed should be rather close. Fluctuations in margins and the influence of prices received by farmers in other states (other sources of supply) would be expected to have some effect on this relationship. Figure 18 shows the relationship of average annual prices received to the United States price paid (retail) based on a five month average. The coefficient of correlation of .94 indicates a close relationship. Applying the test of

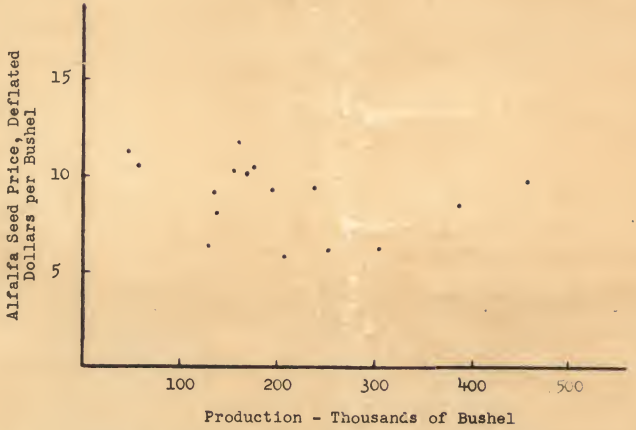

Fig. 17. Relationship of deflated alfalfa seed prices received by Kansas farmers to alfalfa seed production in Kansas, 1939-54.

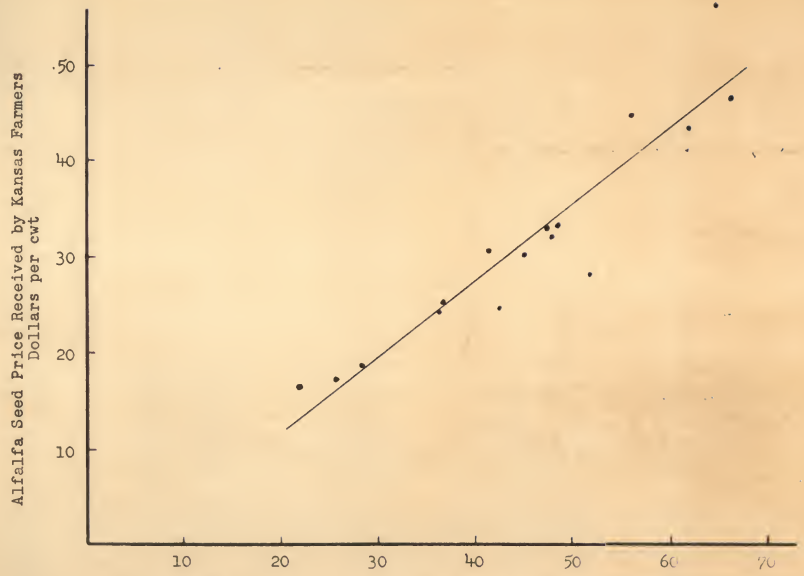

Fig. 18. Relationship of alfalfa seed price received by Kansas farmers to alfalfa seed price paid by United States farmers, 1939-54.

significance, this correlation coefficient is significant beyond the one percent level.

Variation in the production combined with variation in conditions of demand and the relation of the production area to the consumption areas are factors probably affecting annual variation in the margin between Kansas farm price and United States retail price. Because of the interrelation of these factors it is difficult to make a general conclusion in regard to the movement of these margins. Figure 19 indicates the recent movement in prices received by Kansas farmers as a percent of the United States retail price from 1939-1954. There is no apparent trend in this relationship.

Apparently the factors of hay price, price level and production have had little effect upon the price of alfalfa seed received by Kansas farmers. Other external factors influencing supply and demand are probably more influential in the determination of Kansas seed prices which appear to be closely related to the United States prices.

SUMMARY AND CONCLUSIONS

The problem on which this study was based was the need for better understanding of the factors influencing the marketing activities of alfalfa seed producers and dealers in order that they may be in a better position to evaluate these factors in the operation of their enterprises. In summary the following observations and suggestions regarding this problem should serve as an insight into the behavior of alfalfa seed marketing.

Fig. 19. Price received by Kansas farmers for alfalfa seed as a percentage of the United States alfalfa seed retail price paid by farmers, 1939-54.

Alfalfa is one of the most valuable forage crops grown. In Kansas it is grown on more acres than any other crop except wheat, grain sorghums and corn. It is also the fourth ranking crop in use of cultivated land in the United States. In tons of hay produced, alfalfa is the top ranking hay crop in both the United States and in Kansas.

There has been a generally upward trend in alfalfa hay and seed acreage in the United States and also in Kansas in recent years.

Statistical measures indicate that although alfalfa is an important crop, alfalfa seed itself is one of the most highly variable crops in both acreage and production.

Variability in seed production was influenced more by fluctuations in seed acreage than fluctuations in seed yield. Production variability from year to year is quite wide for Kansas alfalfa seed. The coefficients of variation indicate a somewhat lower variation of Arkansas Valley production about its mean than the variation about the mean production in the remaining area of the state.

This factor of production variability has greatly influenced the operations of the seed business making it less certain than the handling of the other important crops. This variability of production combined with the high value per pound of alfalfa seed involves the need for large quantities of capital to finance the purchase and carrying of the seed.

Production areas, for alfalfa seed, are not the areas having the largest acreage of alfalfa hay in the United States.

The western part of the United States has become the chief seed producing region. California has been the leading state in the past five years. Kansas ranked second in 1954 in alfalfa seed production. Reno County has been the leading seed producing county in Kansas in the past five years. The Arkansas River Valley counties produced on an average approximately one-third of the alfalfa seed in Kansas during the period 1949-53.

The survey indicated that a larger percentage of the seed firms are corporation type of organizations than any of the other forms of business organization. This may be due to the need for large quantities of capital to finance this type of high risk enterprise.

With the exception of two firms, all the seed firms contacted were in a group which had a seed business volume of over 50 percent of their total sales. Four of these firms had a seed volume making up nearly 100 percent of their business.

The seed processors surveyed were broken down into three groups. The largest firm group handled over 74 percent of the seed transactions reported while the medium size group handled 24 percent which means that 10 of the 18 firms surveyed handled slightly over 98 percent of the seed volume reported. This indicates the importance of the larger firms in the seed marketing channel.

Approximately 83.5 percent of the seed handled was Kansas common alfalfa and two percent was certified Buffalo.

Purchases of farm seed are made for a large part by buyers at the farm. The clean seed basis was the most common method of purchase. Lot size purchased from farmers averaged 3,370 pounds in 1954. Approximately 90 percent of the seed was purchased in the months of August, September, and October. Reasons why farmers sell then may be that:

1. The seasonal price change may not be pronounced enough to make it profitable for the farmer to store the seed for a higher market in the spring.
2. The high risk of price fluctuations which farmers would have to take in holding the seed may outweigh the advantages of an average seasonal price increase.
3. Alfalfa seed may make up such a small proportion of each grower's income that any gain from holding the seed would not significantly increase his total income.
4. Alfalfa seed may be produced as a cash crop in dry seasons or drouth periods when other farm income is decreased and the demand for cash to meet expenses necessitates the early marketing of the seed.

About five percent of the quantity sold by the dealers contacted were retail sales back to Kansas farmers. The average size lot sold to farmers was 182 pounds or approximately three bushels.

The average wholesale lot sold was almost 43,000 pounds. (A carlot is estimated at 40,000 to 60,000 pounds).

Peak wholesale sales occurred in August and September with a secondary peak in November. The three main planting months

of August, September and April accounted for slightly over 82 percent of the retail sales.

Not only does the high per pound value of alfalfa seed involve extensive financing, but also the difference in time between harvesting and retail distribution seasons involves the important problem of assuming a large market risk.

The lack of market organization has made seed marketing more difficult and hazardous than the marketing of commodities such as grain. No opportunity is available to hedge as in grain futures trading. Therefore the tendency has been for farmers and local dealers to market much of their seed at harvest or soon after to avoid the risk of carrying the seed.

All of the larger seed firms use a combination of seed cleaning machines in processing alfalfa seed. The standard purity for high quality seed is considered to be 99.25 percent. The average cleanout of farm run seed averaged 16.2 percent for 1954. Custom rates for cleaning over a screen mill averaged almost 90 cents per hundredweight on a clean seed basis.

The relationship of alfalfa seed price to price level, wheat price, hay price and other factors was examined. Scatter diagrams and correlation coefficients were used to indicate the relationships.

There was very little relationship between prices Kansas farmers received for alfalfa seed and the general price level, although the price level determines to some extent the general level about which the price of alfalfa seed will fluctuate.

There was a highly significant correlation between alfalfa price received and the price of wheat, a major competitor for land use in Kansas.

Apparently there is very little relationship between alfalfa seed prices and alfalfa seed production. The relation of seed price to alfalfa hay price showed a positive correlation, although not highly significant.

In comparing the price received by Kansas farmers to the price paid by United States farmers for alfalfa seed, there was a very close relationship between the two price series. Although the margin was expected to be rather stable, variations in production combined with variations in conditions of demand are factors influencing deviations from a stable margin.

A study of seasonal variations in the price of alfalfa seed is of value to the producer in judging what time of year it will profit him most to sell his seed. The seasonal index will also help the seed man to estimate what future price may be. The seasonal movement of prices received by Kansas farmers showed a rather narrow range with a high in April and a low in November. The index of irregularity indicated that although there was an upward average seasonal movement from November to April there was so much irregularity that there is little expectation that a movement similar to the average seasonal will be realized in a particular year.

Seasonal price movements therefore have not been regular enough to be used as a consistent guide for seasonal marketing.

Therefore any conclusions regarding the time to market alfalfa seed must also consider carefully the conditions existing in any given year.

The comments which follow are based on a limited examination of production characteristics, the marketing system, seed handling and processing operations, seasonal movement of prices and price relationships influencing alfalfa seed marketing. They are a result of this study and material reviewed in the writings and research of other authors. It is quite apparent that in drawing conclusions from such a study it is impossible to set down any rules that will be successful every year.

1. Due to the nature of seed production and utilization and the absence of an organized marketing system it is doubly necessary that seed men keep abreast of happenings in their areas and in the trade by all means which are available.

2. Plant costs, although not covered in this study, must be considered in relation to the margin necessary to operate at a profit. This should include consideration of costs involved in processing of high quality, high purity seed.

3. Some though must be given to the type of seed cleaning and handling facilities used in seed processing. To obtain a standard high quality seed of 99.25 percent purity additional machinery and plant facilities including design for effective clean up are important considerations.

4. Since there is no organized market system or method of hedging to shift price risk, the method of advance booking of

outlets for later delivery is a consideration which has been employed by some seed men to shift some of the risk of price change while holding seed.

5. Adequate provision for financing a large investment in equipment and high value inventories under conditions of highly variable and unstable market conditions should be considered before adding such an enterprise to the operation of a firm.

6. Comments of the trade indicate that a survey should be made of the utilization areas for seed and more information developed and published on estimated utilization of seed as well as production estimates. Some thought should be given to this matter as very little information is now available on this seed which is needed to maintain forage production and crop rotations important to agriculture.

7. Kansas farmers are in a supply area where they do not deal directly with the utilizer of alfalfa seed. Therefore most seed moves through country dealers, wholesale dealers, and commercial seed houses. There is a lag in time due to shipping, processing, and distribution. Since seed prices are largely based on the trade's estimates of supply in relation to expected demand, the policy of holding seed may be questionable except in areas where the grower and the farmer buyer can deal directly with each other.

To avoid unnecessary price risks it has been recommended that alfalfa seed be sold at the harvest and shipping season. As a general rule this recommendation has had merit since the

price rise between fall harvest and spring has on the average not been great and has shown a great deal of irregularity. There have also been indications that the seasonal variability of alfalfa seed price has been about the same whether the crop is large or small.

Data from the past 20 years indicates that prices of alfalfa seed in the spring months have been lower about 60 percent of the time from the previous August price. Price went up only about 40 percent of the time from August to spring seeding time.

It follows from this then that as a rule farmers who are able to market seed in August, when there is a demand for early planting and the price is strong, should be recommended to take advantage of early marketing instead of storing for spring sale. August marketing avoids both price risk due to unpredicted fluctuation and storage costs as well as the chance of price being lower a greater percent of the time in the following spring.

For later marketed seed, the average seasonal price declines and a greater percentage of the time the spring price has been above September, October, and November prices. For example, spring prices (February-May) have been up about 60 percent of the time from the previous September.

In regard to buying seed, since prices are usually lower in the fall and if a farmer plans for his needs ahead and has a dry rodent free storage space, savings can usually be made by purchasing new crop alfalfa seed in the fall.

ACKNOWLEDGMENTS

For their assistance, without which this study could not have been made, the writer expresses his gratitude to the Kansas seed men who supplied the basic information.

For the assistance given in undertaking and developing this study, the writer is greatly indebted to Dr. Leonard W. Schruben, Professor of Agricultural Economics, Kansas State College. The suggestions offered by other staff members of the Kansas Agricultural Experiment Station and members of the Federal-State Crop Reporting Service were also appreciated.

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MARKETING OF ALFALFA SEED IN KANSAS

by

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AN ABSTRACT OF A THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE COLLEGE
OF AGRICULTURE AND APPLIED SCIENCE

1956

INTRODUCTION

A Marketing Problem

Alfalfa seed has become in recent years a rather important crop in Kansas, especially in certain production areas. However, there has been very little information on either the services and functions of the seed industry which handled the seed or on the methods of pricing and the factors which underlie the determination of alfalfa seed prices which Kansas farmers and dealers receive.

As an indication that a problem existed in this area, there was a request made for information on the advisability of adding seed processing services to the enterprises of a firm in southwest Kansas, an important alfalfa seed producing area. With the increased demands which growers are making for high quality seed, the general assumption is that increased services in performing the functions of handling and processing seed between the producer and utilizer are desirable to increase the quality of Kansas seed in order to compete with seed from other surplus production areas. In order to evaluate this general proposition it is necessary to gain an understanding of the nature of the production of alfalfa seed, of the functions and services which the seed business performs and of the part which pricing and price movements play in the alfalfa seed industry. This work, therefore, was based on the idea that a study of a production area and of a group of processors within this area would provide a

basis for a better understanding of these factors involved in alfalfa seed marketing.

In developing this study other related questions which came up were:

1. What is the nature of the firms in the seed marketing channel?
2. What methods of pricing are used by these firms?
3. What factors influence the price of alfalfa seed?
4. How does uncertainty of price affect the market?
5. When should producers and dealers market alfalfa seed?

It was the purpose of this study, therefore, to investigate some of these aspects of the alfalfa seed industry within Kansas.

Procedure

Alfalfa seed has been considered to be a highly variable and unstable crop as a farm enterprise. This proposition was tested. Since production is highly variable, the seed industry in Kansas, which is largely dependent upon alfalfa seed, was expected to have characteristics differing from the grain industry handling the other important crops of Kansas. Some of these characteristics were examined.

As a corollary of the hypothesis on the nature of production and the characteristics of the seed industry, price movements would be expected to differ markedly from price movements of crops which have more stable production and a

more highly organized marketing system. A study of the seasonal price movement and the relationship of alfalfa seed prices to other prices was made in order to determine how these prices behaved.

In order to get a better understanding of the various aspects of alfalfa seed marketing, this study has been divided into three sections. The first section was a study of factors related to the importance, variability and location of alfalfa seed production. The second section describes a group of alfalfa seed processors and marketing functions which were performed by these firms. These firms were located in the Arkansas River Valley area, an important seed production area in Kansas. The third section was a study of the seasonal movement of alfalfa seed prices and a partial analysis of factors which influence annual prices of Kansas alfalfa seed.

Production Study

Alfalfa is one of the most valuable forage crops grown. In Kansas it is grown on more acres than any other crop except wheat, grain sorghums and corn. It is also the fourth ranking crop in use of cultivated land in the United States. In tons of hay produced, alfalfa is the top ranking hay crop in both the United States and in Kansas.

There has been a generally upward trend in alfalfa hay and seed acreage in the United States and also in Kansas in recent years. Statistical measures indicate that although

alfalfa is an important crop, alfalfa seed itself is one of the most highly variable crops in both acreage and production.

Variability in seed production was influenced more by fluctuations in seed acreage than fluctuations in seed yield. Production variability from year to year is quite wide for Kansas alfalfa seed. The coefficients of variation indicate a somewhat lower variation of Arkansas Valley production about its mean than the variation about the mean production in the remaining area of the state. This factor of production variability has greatly influenced the operations of the seed business making it less certain than the handling of the other important crops. This variability of production combined with the high value per pound of alfalfa seed involves the need for large quantities of capital to finance the purchase and carrying of the seed.

Production areas, for alfalfa seed, are not the areas having the largest acreage of alfalfa hay in the United States. The western part of the United States has become the chief seed producing region. California has been the leading state in the past five years. Kansas ranked second in 1954 in alfalfa seed production. Reno County has been the leading seed producing county in Kansas in the past five years. The Arkansas River Valley counties produced on an average approximately one-third of the alfalfa seed in Kansas during the period 1949-53.

Survey Procedure

Since no studies of the alfalfa seed industry in Kansas have been made, very little information was available on Kansas alfalfa seed marketing. In order to learn more of the marketing of this important forage seed a survey of seed processors was undertaken. Due to the limitation imposed by the lack of time, facilities and finances, it was decided to limit this study to only one area within the state. The area included in this study was the 16 county area adjacent to the Arkansas River Valley which was both an important production area and a rather natural trade territory. The study was also further limited to only the firms which processed alfalfa seed, thus excluding seed buyers and retail outlets not equipped for processing seed as well as seed men who did not handle alfalfa seed in 1954. Therefore, this study considered only the position and influence of these processors in performing marketing functions between the grower and user of seed.

The 1955 Kansas Official Directory of the Kansas Grain and Feed Dealers Association was used as the source of names of firms who processed seed. The 48 firms listed were broken down into two size groups for sampling purposes. All firms in the large group and a 25 percent random sample of the small size group were interviewed. A total of 18 schedules were taken which were the basis for the following part of the study.

Processor Study

The survey indicated that a larger percentage of the seed firms are corporation type of organizations than any of the other forms of business organizations. This may be due to the need for large quantities of capital to finance this type of high risk enterprise.

With the exception of two firms, all the seed firms contacted were in a group which had a seed business volume of over 50 percent of their gross income. Four of these firms had a seed volume making up nearly 100 percent of their business.

The seed processors surveyed were broken down into three groups according to the actual volume of alfalfa seed handled in 1954. The largest group handled over 74 percent of the seed transactions reported while the medium size group handled 24 percent which meant that 10 of the 18 firms surveyed handled slightly over 98 percent of the seed volume reported. This indicated the importance of the larger firms in the seed marketing channel.

Approximately 83.5 percent of the seed handled was Kansas common alfalfa and 2 percent was certified Buffalo.

Purchases of farm seed are made for a large part by buyers at the farm. The clean seed basis was the most common method of purchase. The size of lot purchased from farmers averaged 3,370 pounds in 1954. Approximately 90 percent of the seed was purchased in the months of August, September, and October.

About 5 percent of the quantity sold by the dealers contacted were retail sales back to Kansas farmers. The average size lot sold to farmers was 182 pounds or approximately three bushels. The average wholesale lot sold was almost 43,000 pounds. A carlot is estimated at 40,000 to 60,000 pounds.

Peak wholesale sales occurred in August and September with a secondary peak in November. The three main planting months of August, September and April accounted for slightly over 82 percent of the retail sales.

Not only does the high per pound value of alfalfa seed involve extensive financing, but also the difference in time between harvesting and retail distribution seasons involves the important problem of assuming a large market risk.

The lack of market organization has made seed marketing more difficult and hazardous than the marketing of commodities such as grain. No opportunity is available to hedge as in grain futures marketing. Therefore, the tendency has been for farmers and local dealers to market much of their seed at harvest or soon after to avoid the risk of carrying the seed.

All of the larger seed firms use a combination of seed cleaning machines in processing alfalfa seed. The standard purity for high quality seed is considered to be 99.25 percent. The cleanout of farm run seed averaged 16.2 percent in 1954. Custom rates for cleaning over a screen mill averaged almost 90 cents per hundredweight adjusted to a clean seed basis.

Compared to other annual average prices Kansas farmers receive, alfalfa seed prices apparently have fluctuated about as much as wheat and corn prices. An important difference is that on a bushel basis the price fluctuation in absolute magnitude is much greater due to the high value per bushel. An examination was made to determine if there were local factors associated with the price fluctuation of Kansas alfalfa seed which might provide an explanation of this price movement.

There was very little relationship between prices Kansas farmers received for alfalfa seed and the general price level, although the price level determines to some extent the general level about which the price of alfalfa seed will fluctuate.

There was a highly significant correlation between alfalfa seed price received and the price of wheat, a major competitor for land use in Kansas.

Apparently there is very little relationship between alfalfa seed price and alfalfa seed production. The relation of seed price to alfalfa hay price did not indicate a highly significant correlation.

In comparing the price received by Kansas farmers to the price paid by United States farmers for alfalfa seed, there was a very close relationship between the two price series.

Since the factors of price level, hay price and seed production apparently have little effect on the price of alfalfa seed received by Kansas farmers, other external factors influencing supply and demand are probably more

influential in the determination of Kansas seed prices which appear to be closely related to the United States prices.

A study of seasonal variations in the price of alfalfa seed are of value to the producer in judging what time of year it will profit him most to sell his seed. The seasonal index will also help the seed man to estimate what future price may be. The seasonal movement of prices received by Kansas farmers showed a rather narrow range with a high in April and a low in November. The index of irregularity indicated that, although there was an upward average seasonal movement from November to April, there was so much irregularity that there is little expectation that a movement similar to the average seasonal will be realized in a particular year.

Seasonal price movements therefore have not been regular enough to be used as a consistent guide for seasonal marketing. Therefore any conclusions regarding the time to market alfalfa seed must also consider carefully the conditions existing in any given year.

The comments which follow are based on a limited examination of production characteristics, the marketing system, seed handling and processing operations, seasonal movement of prices and price relationships influencing alfalfa seed marketing. It is quite apparent that in drawing conclusions from such a study it is impossible to set down any rules that will be successful every year.

1. Due to the nature of seed production and utilization and the absence of an organized marketing system it is doubly

necessary that seed men keep abreast of happenings in their areas and in the trade by all means which are available.

2. Plant costs, although not covered in this study, must be considered in relation to the margin necessary to operate. This should include consideration of costs involved in processing high quality, high purity seed.

3. Some thought must be given to the type of seed cleaning and handling facilities used in processing. To obtain a standard high quality seed of 99.25 percent purity additional machinery and plant facilities including design for effective clean up are important considerations.

4. Since there is no organized market system or method of hedging to shift price risk, the method of advance booking of outlets for later delivery is a consideration which has been employed by some seed men to shift some of the risk of price change while holding seed.

5. Adequate provision for financing a large investment in equipment and high value inventories under conditions of highly variable and unstable market conditions should be considered before adding such an enterprise to the operation of a firm.

6. Comments of the trade indicate that a survey should be made of the utilization areas for seed and more information developed and published on estimated utilization of seed as well as production estimates. Some thought should be given to this matter as very little information is now available

on this seed which is needed to maintain forage production and crop rotations important to agriculture.

7. Kansas farmers are in a supply area where they do not deal directly with the utilizer of alfalfa seed. Therefore most seed moves through country dealers, wholesale dealers and commercial seed houses. There is a lag in time due to shipping, processing and distribution. Since seed prices are largely based on the trade's estimates of supply in relation to expected demand, the policy of holding seed may be questionable except possibly in areas where the grower and the farmer buyer can deal directly with each other.

To avoid unnecessary price risks it has been recommended that alfalfa seed be sold at the harvest and shipping season. As a general rule this recommendation has had merit since the price rise between fall harvest and spring has on the average not been great and has shown a great deal of irregularity. There have also been indications that the seasonal variability of alfalfa seed price has been about the same whether the crop is large or small.

Data from the past 20 years indicated that prices of alfalfa seed in the spring months have been lower about 60 percent of the time from the previous August price. Price went up only about 40 percent of the time from August to spring seeding time.

It follows from this then that as a rule farmers who are able to market seed in August, when there is a demand for early planting and the price is strong, should be recommended

to take advantage of early marketing instead of storing for spring sale. August marketing avoids both price risk due to unpredicted fluctuation and storage costs as well as the chance of prices being lower a greater percent of the time in the following spring.

For later marketed seed, the average seasonal price declines and a greater percentage of the time the spring price has been above September, October and November prices. For example, spring prices (February-May) have been up about 60 percent of the time from the previous September.

In regard to buying seed, since prices are usually lower in the fall and if a farmer plans for his needs ahead and has a dry rodent free storage space, savings can usually be made by purchasing new crop alfalfa seed in the fall.